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ABSTRACT

This study reports the results of a secondary analysis of two years posthospitalization data from 2,950 subjects. Subjects' Alcoholics Anonymous Attendance and aftercare attendance (test variables) were correlated with 11 outcome variables suggestive of successful adaptation to their chemical abuse problems. A model conceptualized subjects' outcome performance in terms of the interactions among eight control variables, reflecting subject characteristics, and the test variables. Bivariate analyses found that the control variables were unrelated to AA attendance, weakly related to aftercare attendance and somewhat more related to sobriety. Sobriety was the only outcome variable significantly related to both test variables across time. The data did not support a multidimensional model of outcome performance. Cross-lagged panel analysis supported the hypothesis that the correlation between AA attendance and sobriety was not spurious. Although sobriety did effect AA attendance, AA attendance was more important in determining sobriety. Cross-lagged analysis was not able to reject a null hypothesis that the correlation between aftercare and sobriety was spurious. AA attendance was the most important variable selected in the stepwise regression of sobriety across time. Aftercare was selected only in the 6-month and 12-month follow-up intervals. Taking into account the control variables, AA attendance accounted for the largest portion of the variance in sobriety. Aftercare accounted for only a negligible increase in the explanation of the variance in sobriety. The adequacy of the model guiding this study was questioned. An alternative model, based on the results of this study was proposed.

**ALCOHOLICS ANONYMOUS ATTENDANCE, AFTERCARE, AND OUTCOME:  
A SECONDARY ANALYSIS OF TWO YEARS  
POSTHOSPITALIZATION DATA**

**A THESIS  
SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL  
OF THE UNIVERSITY OF MINNESOTA  
BY**

**DAVID CARNER LULL**

**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY**

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contributions to the health care field were one of the factors in my decision to attend the University of Minnesota. His guidance during my transition from clinician to doctoral student was invaluable. His willingness to engage in discussion of my issues combined with the forthright candor of his feedback helped to structure my search for a research topic.

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## CHAPTER ONE: INTRODUCTION

### OVERVIEW

The introduction provides an overview of the study. First, a number of important issues in the alcoholism treatment field are discussed briefly to provide contextual understanding and grounding of the rationale for undertaking this study. Second, a concise purpose statement is presented followed by a short discussion of the expected contributions of this study towards the advancement of knowledge. The final section of the introduction outlines the methodological design of the study, provides an explanation for the purposive sampling<sup>1</sup> used in the study, and introduces the concept of directional inference in relation to correlational designs.

### ESTABLISHING THE CONTEXT OF THE STUDY

Alcohol abuse and alcoholism have been described as multi-faceted phenomena which affect the social, psychological, and biological functioning of persons dealing with alcohol problems (Mendelson and Mello, 1979;

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<sup>1</sup> Purposive sampling "is a form of nonprobability sampling which is characterized by the use of judgment and deliberate effort to obtain samples" (Kerlinger, 1986, p. 120). "The units to be observed are selected on the basis of the researcher's own judgment about which ones would be most useful" (Babbie, 1986, p. 556).

Polich, Armor, and Braiker, 1981; and Vaillant, 1983). The estimated societal cost for these alcohol-related problems in the United States approached \$117 billion in 1983, the latest year for which estimates are available (Cahalan, 1987).<sup>2</sup> Currently it is estimated that the total "expenditures for alcoholism treatment in the United States exceed \$15 billion per year" (Bowen, 1987, p.136).

Prevalence estimates of the number of people with drinking problems vary significantly depending on which criteria are used to define "drinking problems." Bowen (1987) estimated that 18 million Americans, aged 18 or older, experience alcohol-related problems (p. 12). In the First Special Report to the U.S. Congress on Alcohol and Health in 1971, as reported in Cahalan (1987), it was estimated that "five percent of the adult population manifest the behaviors of alcohol abuse and alcoholism" (p. 17).<sup>3,4</sup> Recent journal articles have pointed to significant age, gender, and ethnic variation in the prevalence of alcohol related problems (Caetano, 1984; Lex, 1985; and Wilsnack, Wilsnack, and Klassen, 1985).

To discuss "alcoholism treatment" begs, to some degree, an important question regarding the nature of the problem. While one continues to hear colloquial and informal use of the terms "alcoholism" and "alcoholic", a

---

2 According to Bowen (1987), this estimate of the societal cost of alcohol related problems is not directly comparable to earlier estimates due to substantial methodological differences in the computation of the estimate (p. 21).

3 A more recent estimate of the prevalence of alcoholism was presented by Schuckit (1985) who concluded that "between 5% and 10% of the adult American male population will develop alcoholism at some point in their lifetime" (p. xi). Hilton (in press), as reported in Bowen (1987), calculated that 14% of male and 6% of female drinkers report a "moderate amount of tangible consequences from their drinking" (p. 12).

4 Based on data collected at three sites of the Epidemiological Catchment Area program, lifetime prevalence rates of alcohol abuse/dependence for males were estimated between 19.1% - 28.9%. The lifetime prevalence rates for females were estimated between 4.2% - 4.8% (Robins, Helzer, Weissman, Orvaschel, Gruenberg, Burke, and Regier, 1984, p. 954).

review of the current clinical and research literature regarding alcohol problems reinforces the position taken by Wanberg and Horn (1983) that "alcoholism is not a unitary phenomenon and that multiple syndromes are necessary to describe persons with alcohol-related problems" (p. 1055).<sup>5</sup> While the heterogeneity of alcohol problems is evident and increasingly addressed in the literature, the dividing lines between "people with alcohol problems", "alcohol abuse", "alcohol dependence" and "alcoholism" remain, for the most part (and notwithstanding DSM-III-R<sup>6</sup>) remarkably subjective.<sup>7</sup>

Although definitional issues are rife, there is a consensus that, for most people who are formally diagnosed as being alcoholic, resolving the alcohol-related problems involves a long-term process of coming to terms with the chronicity of their alcohol problems. Rather than achieving a "cure" for a discrete illness, current treatments emphasize lifestyle adjustment to a chronic condition which can include (and often recommend) extensive use of social support networks, such as Alcoholics Anonymous (AA) meetings or formal aftercare treatment groups (Favazza and Thompson, 1984).

This study approaches the subject of alcoholism intervention recognizing the necessity of lifestyle adjustment to a chronic condition. While lengthy periods of "remission" are possible and desirable; recovery from alcoholism is also likely to include periodic relapses into problematic drink-

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5 In contrast, Vaillant (1983) prefers to view severe alcohol abuse as "reflecting a relatively unitary disorder that results from the coming together of multiple etiological risk factors (p. 45).

6 American Psychiatric Association (1987). Diagnostic and Statistical Manual of Mental Disorders (Third Edition- Revised). Washington D.C.: American Psychiatric Association.

7 Metzger (1988) notes that there have been hundreds of definitions of alcoholism "presented by specialists in the field" with no agreement among them (p. 8). "There has never been a universally accepted definition of alcoholism" (NASW, 1987, p. 133).

ing.<sup>8</sup> The multi-determined model of alcoholism,<sup>9</sup> upon which this study is based, relies on a health metaphor<sup>10</sup> which reflects an appreciation of the interactive relationships among: predisposing factors, exposure, social learning, mitigating circumstances, and resulting behaviors.

A substantial portion of the published literature in the alcohol treatment field is devoted to demonstrating treatment impact and efficacy (Emrick, 1975). While this emphasis is understandable in terms of quality assurance issues and limited resources, it has had the untoward effect of narrowing the focus and shifting the emphasis of research away from the chronic nature of alcohol problems. Focusing on the short-term response to treatment has tended to mask the complexity and chronicity of alcohol related problems. For the most part, the issues of short-term versus longer term prognoses remain to be studied.

Another influencing factor on current research can be seen in the social policy literature regarding alcohol problems. Of particular interest is the effect of the current governing images<sup>11</sup> on the definition of alcohol problems and which interventions are being viewed as appropriate for

---

8 Relapse into problematic drinking, particularly following "successful" treatment is considered by Marlatt and Gordon (1985) to "characterize the addictive disorders" (p. ix). Recent research has demonstrated that "relapse into alcoholic drinking reflects conditioned behavior, not a capricious desire or a simple response to psychological conflict" (Vaillant, 1983, p. 177).

9 Vaillant (1983) sees alcoholism defined "by the number and frequency of alcohol-related problems", not just the presence or absence of specific, commonly accepted signs and symptoms (p. 35).

10 As involving a state of "complete physical, mental, and social well-being and, according to the World Health Organization, not merely the absence of disease or infirmity" (Barker, 1987, p. 69).

11 Governing images refer to "shared simplifications" involving "widespread understanding and acceptance." A "body of conventional wisdom" which focuses attention on those aspects of a problem, deemed by society, to be most important. The governing images are "so powerful and seem so much a part of our current society, it is hard to ask effective and probing questions about their limitations" (Moore and Gerstein, 1981, pp. 6-15).

problem resolution (Moore and Gerstein, 1981). The alcoholism treatment field can be differentiated from other health care areas by the degree to which ideology influences treatment decisions.<sup>12</sup> For example, although the available empirical data is clearly equivocal regarding the value of aftercare programming, most treatment programs lend whole-hearted support to the concept of some type of sustained aftercare effort on the part of their clients.<sup>13</sup>

To this end, a number of treatment programs offer specific, time limited outpatient programs to facilitate posthospitalization adjustment. Similarly, Alcoholics Anonymous (AA) stresses the importance of developing a long-term relationship with AA as a support group for the recovering alcoholic's personal program for maintaining sobriety. Combining these two "beliefs", in the absence of strong empirical confirmation, a number of treatment programs utilizing the AA philosophy<sup>14</sup> often make explicit in their discharge instructions the expectation that clients follow-up with AA as well as attend aftercare.

The two-year time period immediately following subjects' discharge from inpatient chemical dependency treatment facilities has been shown not to be a particularly stable time. Research has demonstrated that subjects tend to experience many "ups and downs" across this time period (Polich, Armor, and Braiker, 1981; Pettinati, Sugerman, DiDonato, and Maurer, 1982, and Bratter and Forest, 1985). Intuitively, it would seem that relative

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<sup>12</sup> For the impact of ideology on treatment decisions see Tournier (1979) and the responses to his article which were published in the same issue of the journal.

<sup>13</sup> As recent as January, 1987, Secretary of Health and Human Services Bowen noted that "aftercare services are a critical component...and considered essential" (p.133).

<sup>14</sup> The term "AA philosophy" refers to the "Twelve Steps" of AA which offer a logically intuitive means of structuring one's life to stop the use of alcohol and identify and make necessary changes in relevant behaviors, attitudes and relationships. See Alcoholics Anonymous (1952).



adjustment during this time period could be enhanced, in part, by the clients' abilities or efforts to make use of available supportive resources such as aftercare groups and AA. From a different perspective, Costello, (1975) found that the provision of aftercare was one of the seven characteristics which distinguished successful from unsuccessful treatment programs (p. 857).

A final issue which has been the subject of much discussion for the past 26 years is the measurement of outcome. How is the response to treatment established? Early research focused on abstinence from further consumption of alcohol as an important, and for the most part, only measure of outcome.<sup>15</sup> Beginning with Davies' (1962) observation that some alcoholics appeared to be able to resume successful social drinking, the adequacy of abstinence as an outcome measure has been subject to much inquiry. The debate about the pros and cons of the abstinence issue has taken on the appearance of a pendulum effect. Most recently, as Secretary of Health and Human Services, Bowen (1987) concluded that "abstention from alcohol and other psychoactive drugs continues to be the most reasonable treatment goal for diagnosed alcoholics in light of current scientific and clinical information" (p. 136).

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<sup>15</sup> For a balanced discussion of the "abstinence issue" see Bean and Zimberg (1981) or Moore and Gerstein (1981).

## PURPOSE AND SIGNIFICANCE OF THE STUDY

With relatively few exceptions, when clients complete inpatient chemical dependency treatment, they are encouraged to attend both aftercare and AA meetings.<sup>16</sup> This study attempted to look at the relationships between the subjects' reports of attending aftercare and AA meetings and the subjects' responses to a number of outcome measures reflective of successful adaptation to their chemical dependency problems. Does attending an aftercare program<sup>17</sup> influence subsequent outcome? Is there a correlation between "active" AA attendance<sup>18</sup> and subsequent outcome functioning? Is there a synergistic or additive effect for clients who participate in both aftercare programs and AA in terms of outcome?

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<sup>16</sup> In the case of the study sample, 94.3% of the subjects were referred to AA. In contrast, 73.4% of the subjects were referred to aftercare. The smaller percentage of aftercare referrals was due to some subjects having been discharged to locations where aftercare was unavailable. Categorizing the subjects in terms of their proximity to aftercare, no significant differences were noted in terms of either aftercare attendance or AA attendance. A number of treatment centers reported to the author that they attempted to refer clients who lived at a distance from their program to other aftercare programs in the area in which the clients lived.

<sup>17</sup> "Aftercare" refers to the widely accepted practice of providing a time-limited period of transitional support to clients who are being discharged from inpatient chemical dependency treatment. Most aftercare involves weekly group sessions structured around the tasks of maintaining sobriety. Aftercare, unlike self-help groups, involves a fee-for-service, paid directly, or included indirectly as part of a package deal for combined inpatient and follow-up services. Aftercare groups are staffed by or supervised by professional alcohol counselors as opposed to self-help groups, whose leadership comes from the ranks of the membership. See Chapter 6 for a discussion of the limitations regarding this variable.

<sup>18</sup> AA attendance refers to clients' self-reports of attending Alcoholics Anonymous meetings. AA is a well established self-help group for recovering alcoholics. Current United States membership is reported as 630,700 (AA world Services, 1984). Other than periodic surveys, AA maintains no membership lists, nor are there any requirements for membership other than a desire to not drink. There are many anecdotal reports regarding the positive contributions of AA to clients. Direct study of the organization has been hampered by a number of methodological problems.

Practice wisdom, buttressed by anecdotal accounts, would suggest that some type of aftercare involvement is preferable to no involvement. For the most part, previous empirical studies have tended to focus on aftercare involvement and AA participation as either dependent variables reflecting a positive treatment outcome<sup>19</sup>, or as independent variables, but combined with other treatment elements, as part of a combined treatment effect (Emrick, 1975; Finney, Moos, and Mewborn, 1980; Pettinati, et al., 1982; and Ornstein and Cherepon, 1985).

In contrast to the above, this study looks at aftercare and AA attendance following discharge from inpatient chemical dependency treatment as important predictor variables in terms of their correlation with the outcome variables.<sup>20</sup> Understanding the multidimensional aspects of recovery from alcoholism, a number of indicators of outcome were selected. Sobriety, the ability to maintain abstinence from alcohol and other drugs, was included as an outcome measure. The author's clinical experience<sup>21</sup> suggested that since problematic drinking was at the heart of the issue, abstinence from further use of alcohol and drugs should be an exceptionally salient outcome variable.

This study makes a contribution to the advancement of knowledge in a number of ways. First, while inferences have been drawn about possible interactive relationships between aftercare and AA attendance, this is the

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19 As a dependent measure, aftercare attendance or AA attendance would be considered signs of a successful adjustment and positive outcome.

20 The term "predictor variable" is synonymous with the term "independent variable." In this study the independent variables have been classified as either "control variables" or "test variables." The term "test variables" is used frequently within the study to replace the awkward repetition of the phrase "AA attendance and aftercare attendance." The term "test variables" will always refer to both AA attendance and aftercare attendance.

21 The author served as the Assistant Director of the U.S. Air Force Medical Center's Alcoholism Rehabilitation Center in Wiesbaden, West Germany, 1982- 1985.

first study, to the author's knowledge, to systematically explore the relationships between these two variables and their relative contributions to outcome.

Second, the sample selected for this study consisted of subjects who were considered to be relatively "high-functioning"<sup>22</sup>, and consequently, would be more representative of mainstream America than many of the other studies which focus almost exclusively on either indigent or chronically disabled populations.<sup>23</sup> Studying "successful adaptation" in the latter settings is neither reflective of the experiences of the majority of clients who go through chemical dependency treatment and remain functional, nor particularly relevant for understanding how higher functioning groups utilize supportive services in the maintenance of their sobriety.

Third, the focus of the study is exploratory in nature and reflects a strong commitment to empirically describing relationships. Rather than accepting the status quo and "obvious", which tend to be heavily biased by ideological concerns, this study proposes to ask basic questions regarding the relationship between aftercare, AA attendance, and subsequent outcome. Through a secondary analysis of a large data pool (N = 2,950), the goal of the study was to extend our understanding of the relationships between the test variables and selected outcome variables.<sup>24</sup>

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<sup>22</sup> The majority of subjects in this sample had completed at least 12 years of education and, for the most part, were employed.

<sup>23</sup> A recurring theme in the literature reviews of alcoholism treatment is the narrow focus of most research samples from which global conclusions tend to be made. For the most part, our current understanding of alcoholism treatment tends to be based on relatively small samples of white males drawn from Veterans Administration Medical Center populations, which tend to be less functional, more disabled, and significantly older, than mainstream America.

<sup>24</sup> The secondary analysis was guided by a model, developed from a review of the literature and the author's clinical experience, which hypothesized relationships between the test variables,

Fourth, the use of bivariate analyses with cross-lagged panel analyses, multiple regression analyses, and a linear discriminant analysis, substantially added to our understanding of the relationships among the study variables. For the most part, data analysis within the alcoholism treatment field has remained fairly rudimentary.<sup>25</sup> The increased sophistication of the design of this data analysis enhanced the credibility of the findings through the use of "data analytic procedures which were well established and considered to be the methods of choice in psychology and other social and behavioral sciences" (Bentler, Lettlerl, and Austin, 1976, p. 161).

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control variables, and outcome variables. See "Table 5: Hypothetical Model of the Relationships Among the Test variables, Sobriety, and Other Variables Suggested by a Review of the Literature" in the third chapter.

<sup>25</sup> Shuckit (1985) observed that many "empirically minded researchers shun research in this area," due primarily to the presence of many methodological problems (p. xii). Certainly one reason for this situation is a reluctance to ask hard questions which may challenge beliefs or the governing images.

## METHODOLOGICAL OVERVIEW

The central questions of this study look at the relationship between aftercare and AA attendance, and whether, as test variables, they correlated with selected outcome variables. The research questions were addressed through a secondary analysis<sup>26</sup> of a subgroup of a larger population of subjects who had been followed, with varying degrees of success, for a two-year period following their discharge from chemical dependency treatment programs.

The intent of the study was to clearly explicate the relationships among variables within the selected sample. For this reason, the sample of subjects for this study was limited to subjects for whom as much information as possible was available. The underlying rationale for this approach was to maximize the probability of explicating the relationships among variables. Consequently, it was expected that the data from the subgroup of subjects analyzed in this study might differ in some respects from other subgroups of subjects drawn from the larger population which were missing data from one or more follow-up interviews.<sup>27</sup>

Data from a sample chosen to maximize available knowledge about the subjects, could be used at a later date as a baseline for the purposes of comparison with other samples with varying degrees of available information about their subjects. Through a conscious limiting of the scope

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26 Kruzich (1981) documented the importance of secondary analysis of extant data for the purpose of addressing longitudinal questions (p.3).

27 This point was underscored by MacKenzie, Funderburk, Allen, and Stefan (1987) who found that subjects for whom data were lost were difficult to interview rather than difficult to locate, the former of which correlated with worse drinking outcome (p. 119).

of the population under the study, it was expected that the enhanced understanding of relationships among the variables would offset any limitation in terms of the generalization of the findings.

One of the difficulties in the interpretation of a correlational design is the issue of ruling out alternative explanations for observed relationships (Carmines and Zeller, 1979). In particular, one may ask if the observed relationship between attending aftercare and/or AA attendance and the clients' measure on an outcome variable is spurious. Perhaps the observed relationship simply reflects higher levels of motivation for resolving the alcohol related problems. Rather than AA attendance or aftercare attendance, the underlying factor might be one of differential motivation.

Looking at the possible relationships between AA attendance and abstinence from alcohol, for example, one can clearly see the dilemma. A large correlation coefficient between the two variables could be accounted for by at least two opposing hypotheses. The first, and perhaps more intuitive explanation is that attendance at AA meetings could provide a strong reinforcement for maintaining sobriety. In this respect, AA attendance might be thought of as influencing sobriety. An equally valid alternative interpretation of the relationship, however, is that people who are able to maintain their sobriety are also attracted to AA groups. From this perspective, sobriety could be said to influence AA attendance. Recent advances in data analysis techniques allow for beginning directional inferences to be made from correlational data.<sup>28</sup> This study will use cross-

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28 For an detailed discussion of crossed-lagged panel analysis procedures see Rozelle and Campbell (1969), Goodman (1973), and Kenny (1975).

lagged panel analysis to both comment on hypothesized directionality in the relationships between test variables and outcome variables, and assess the probability that the observed relationships are spurious.

The design of this study involved a secondary analysis of extant data which explored the relationships between attending aftercare programs and/or AA meetings, and a variety outcome measures. A number of variables, previously identified in the literature as germane were controlled for in this analysis. The variables were looked at first in terms of their bivariate relationships. Second, building on the work of Vanicelli (1978) and Costello (1980) cross-lagged panel analysis was used to address possible directionality in the correlation between predictor variables and relevant criterion variables, and rule out the possibility that the observed relationships were spurious rather than real. Third, through multiple regression analyses, the previously described model was tested to see whether the addition of aftercare and/or AA variables to the regression equation improved its explanatory power over that provided by the only control variables for predicting the outcome variables. In combination with a cross-validation of the multiple regression results, a discriminant analysis was used in the last step of the design to assess the efficacy of the model chosen to guide the secondary data analysis

This chapter has presented an overview of the context, purpose, and design of this study. Through a sophisticated secondary analysis of data collected from subjects who were discharged from chemical dependency treatment, the goal of the study was to explicate the relationships between attending aftercare, AA attendance, and their correlations with outcome variables over a two-year time period. In a practice field dominated by



ideological concerns, the empirical perspective of this study was thought to be particularly germane. The next chapter will discuss a review of the literature upon which this analysis was based.

## CHAPTER TWO: LITERATURE REVIEW

### OVERVIEW

The literature review has been divided into six sections in order to address the complexity of the literature in this field. After providing a brief overview of the literature reviewed for this study, the second section will summarize relevant findings from the treatment outcome and program evaluation literature. The third and fourth sections will address specific findings from a review of articles discussing aftercare attendance and AA participation. The fifth section will summarize the literature from studies which looked at self-help groups and social support. The sixth section will provide an overview of a number of methodological and design concerns reported in the recent literature. The final section of the literature review will discuss issues of validity and reliability relevant for this study.

### OVERVIEW OF THE LITERATURE REVIEW

A review of the literature provides insight regarding the conceptual and methodological issues with which researchers have had to struggle. Clinical intuition, treatment ideology and methodological requirements tend

to mix rather uncomfortably.<sup>1</sup> Consensus is achieved in a negative sense in terms of agreement regarding methodological and conceptual limitations. As will be discussed below, for most of the subject areas, the only consensus is that there is no consensus.

Heckler (1983) has observed that "treatment research is passing through a transitional period during which the basic assumptions are being reevaluated" (p. 115). Certainly this study has been undertaken with an appreciation of this perspective. Heckler's comments are viewed as "permission" to stop, take stock and actively question what previously has been accepted as obvious.

In addition to conceptual and methodological limitations noted above, another possible explanation for the absence of consensus in the research findings results from attempting to bend empirical findings to fit preconceived notions about how things ought to be, rather than questioning the hypotheses which do not fit the resulting data. This study focuses on several issues which sit at the heart of much of the discussion regarding basic assumptions about the roles of aftercare, AA, and what constitutes appropriate outcome measures.

As a starting point, consider Voris' (1981- 82) comments about methodological issues addressed in two classic literature reviews, published more than twenty years apart in 1942<sup>2</sup> and 1967,<sup>3</sup> respectively. Both studies reached the same conclusion that it was "impossible to form

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<sup>1</sup> The alcoholism treatment field is somewhat unique in terms of utilizing a large corps of recovering clients to provide paraprofessional treatment services. The recovering staff members tend to ground their expertise and knowledge in terms of their personal experience with alcoholism rather than in empirically based findings.

<sup>2</sup> See Voegtlin and Lemere (1942).

<sup>3</sup> See Hill and Blane (1967).

any sort of opinion about the value of treatment from an examination of the literature alone" (p. 550). In a more recent literature review updating the earlier findings, Gordis, Dorph, Sepe, and Smith (1981) were able to continue to conclude that "global conclusions about outcome, based on the literature are impossible" (p. 521).

At the heart of much of this discussion are problems with definitions of predictor and criterion variables, competing theoretical models, and relative absence of consistently significant findings. For all the above reasons, the chemical dependency treatment field has been in a rather unenviable position of not being able to empirically confirm, for the most part, that their contributions, efforts, and concomitant societal costs, result in substantial benefits for either their clients or the community at large.<sup>4</sup>

The complexity of this literature review resulted from the number of topical areas which needed to be reviewed in order to place the subject of this study within its proper context. Having completed the literature review, it is the author's observation that what was missing was a general model to provide an overall structure, within which the many relationships among topics addressed or referenced in this study could be explored. Part of this difficulty may have been related to our tendency to compartmentalize topics rather than see things in terms of their commonality.

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4 Prof. James Kincannon, in a class discussion, made the observation that regardless of what particular predictor variable was studied, it would ultimately explain about six percent of the variance in whatever criterion variable was being studied. He named this observation "Kincannon's Law of Six Percent." His comments presented in: Public Health 5047: Intervention/ Secondary Prevention of Drug Abuse in Adults, Spring Quarter, 1987.

### SUMMARY OF TREATMENT OUTCOME STUDIES

Emrick (1975) reviewed a large number of outcome studies and concluded that "few significant long term differences could be found when comparing treatment with no treatment groups" (p. 91). One explanation for the absence of "long term differences" may be found in terms of the theoretical perspectives taken by the researchers. As noted above, ideological predisposition has tended to cloud the picture. One example of this can be seen in the number of studies which persist in narrowly defining success in terms of long term, never interrupted sobriety.

A number of studies have concluded that intervention into alcohol problems does not produce a significant lasting effect, because relatively few clients achieve long term, stable sobriety, however defined (Pollich, Armor, and Braiker, 1981; Gottheil, Thornton, Skoloda and Alterman, 1982; and Vaillant, 1983). In direct contrast, the author was impressed by the many successful anecdotal accounts published in the literature for recovering alcoholics, or in the "war stories" told and retold at AA meetings.<sup>5</sup> While the amount of continuous, never interrupted sobriety was rarely discussed in the literature or the meetings, the positive description of periods of sobriety was quite noticeable. Particularly relevant for this discussion were the anecdotal observations in which identified changes in

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<sup>5</sup> The author attended a number of Open AA meetings within the Twin Cities area to gain an experiential understanding of the dynamics and mechanics of AA meetings. The membership was advised that the visits, during the Fall and Winter Quarters, 1987, were for the purpose of educating the author. The visits were congruent with AA's position of providing open meetings so that interested persons may learn about alcoholism and how to stop drinking (AA World Services, 1975, pp. 77- 80)

patterns over time were noticed where periods of sobriety were increasing in length while relapses were shorter and easier to control.

One of the problems researchers have encountered is that empirically derived data does not appear to support the concept of success as defined by the requirement of the need to maintain long-term sobriety. Instead, Schuckit, Schwei, and Gold (1986) note, the natural course for the average alcoholic involves a "cyclic pattern<sup>6</sup> alternating between periods of problem drinking, abstinence, and moderate drinking with few problems" (p. 151). This variety and fluidity in behavioral performance is obscured in the interpretation of the data, in part, by ideological blinders of expectation. For example, Gotthell et al. (1982) found that, while abstinence was the most desirable treatment outcome because subjects who abstained from alcohol did better at each follow-up period, only about ten percent of their sample was able to be "persistently abstinent" (p. 564).<sup>7</sup>

In part, the problem is also related to the use of research designs which look at outcome either cross-sectionally, or longitudinally using only two data-gathering points. If the researcher gathers data for a two-year follow-up period at only one or two data gathering points, it is quite likely that the considerable movement between drinking and sober categories will be missed. Pettinati, Sugerman, DiDonato, and Maurer (1982) label this phenomenon "window viewing", i.e., looking at an "individual's life at only one point in time" (p. 201). In their four-year follow-up of clients, they found that only about 29% of their subjects were able to maintain

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<sup>6</sup> This finding contradicts the position taken by AA that untreated alcoholism involves an inexorable, unidirectional progression towards ever increasing severity and ultimate mortality.

<sup>7</sup> The author notes parenthetically that whether these findings are to be interpreted positively or negatively, depends, for the most part, on one's theoretical position rather than the relative merits of the data or any intrinsic validity or "truthfulness" to be found in the data.

consistent patterns of abstinence and consistent adjustment in terms of an absence of behavioral problems. The majority of their subjects tended to fluctuate between good adjustment and further problems.<sup>8</sup>

Much of the outcome literature has focused on either client characteristics or characteristics of treatment programs, both of which, taken together, have tended to explain only a small portion of the total variance in the criterion variables. (Adamson, Fostakowsky and Chebib, 1974; Bromet and Moos, 1979; Kruzich, 1980; Elal-Lawrence, Slade and Dewey, 1986, 1987). In the search for additional variables which might further enhance our understanding of outcome, researchers have turned to posttreatment and environmental factors (Bromet and Moos, 1977; Cronkite and Moos, 1980; Finney, Moos and Mewborn, 1980).<sup>9</sup>

Reframing the Issue, It appears to the author that social support, as an environmental factor (the availability of which is common to discussions of client characteristics,<sup>10</sup> treatment programs, and posttreatment experiences), may play an important role in determining outcome. A common theme in families, employment, aftercare, and AA attendance, etc., is the availability of a supportive structure or social network which can act as a

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<sup>8</sup> The author notes that the issue of the length of follow-up interval, for the most part, has not been addressed in the literature. Pettinati et al. (1982) describe the impact of "window viewing" but used annual follow-up intervals in their four year longitudinal study. Hoffmann and Harrison (1986) is one of the few studies which combined frequent follow-up intervals (every six months) with sufficient length of time (two years follow-up) to comment on longitudinal trends with some degree of confidence that fluctuation in behavioral changes will have been identified.

<sup>9</sup> Walker, Sanchez-Craig, and Bornet (1982) found pretreatment variables to be more important than treatment variables in explaining outcome variance, while Cronkite and Moos (1980) found posttreatment factors to be more important than pretreatment variables in explaining variance in the outcome variables.

<sup>10</sup> Client characteristics play a significant role in terms of the clients' differential abilities to make use of social support. The author's clinical experience has found that it was a very difficult task for clients with schizoid or avoidant personality disorders to effect a successful transition into support groups.

buffer between the alcoholic client and sources of stress (Cobb, 1976; Billings and Moos, 1981; Biegel and Yamatani, 1987).

Several studies have reported on the apparent relationship between alcoholic subjects having access to family members and subsequent outcome (Costello, 1975; Tomsovic, 1980; Neubuerger et al., 1982). Supportive environments mediate stress and help to reduce recidivism through the adoption of alternative problem solving strategies. Bromet and Moos (1977) suggest that alcoholics in stable marital and/or work situations have a more favorable adjustment (p. 326). Regular AA attendance has been associated with an absence of life problems (Taylor, Helzer, and Robins, 1986).<sup>11</sup>

In 1977, Gibbs and Flanagan published the results of their search for general prognostic indicators which would be stable across studies and consistently predict positive outcomes.<sup>12</sup> Their work has become a reference point, allowing more recent studies to assess the relative clarity of the contribution of their respective predictor variables to an understanding of their association with the outcome variables. Part of their hypothesis was that strong or robust predictor variables could be identified from a review of the frequency of the predictor variable's use in the literature.

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<sup>11</sup> In general it should be noted that most studies which look at the relationship between AA and outcome variables, do not find an association between AA and behavioral outcomes, with the exception of remaining abstinent from alcohol.

<sup>12</sup> Currently, much of the treatment outcome research is directed towards locating specific characteristics of clients, treatment settings, or background environmental influences which can be used to predict outcome. This increased interest in the search for prognostic indicators originates in a concern for cost-effectiveness and cost-control of treatment expenses.



Table 1: Relationship of Study Variables  
to Gibbs and Flanagan (1977) Typology of Predictor Variables

		<u>Predictive Value or Utility<sup>13</sup></u>			
<u>Predictors</u>		<u>(+)</u>	<u>(-)</u>	<u>Non-predictive</u>	<u>Total* #Predictive/Total</u>
1.	# of times CD Tx	not reported			
2.	AA attendance	2	0	4	6
3.	aftercare	not reported			
4.	age	16	1	18	35
5.	education	6	1	13	20
6.	employability	4	0	2	6
7.	ethnicity	5	1	5	11
8.	marital status	12	0	0	12
9.	sex	5	1	7	13
10.	type of substance	not reported			

(\* Total number of treatment groups attempting the use of a specified predictor).

Gibbs and Flanagan (1977) looked at 208 predictor variables used in 45 studies involving 55 treatment groups. None of the variables met the researchers' criteria of producing significant results in a minimum of six studies. What they found was that in some studies the specific variables demonstrated predictive power in one direction, while in other studies the same predictor variable would demonstrate predictive power in precisely the opposite direction, or there would be no predictive relationship evident. This pattern of inconclusive performance was repeated for all of the predictor variables.

Table 1 compares Gibbs and Flanagan's typology with the eight control variables and two test variables identified in this study as predictor

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<sup>13</sup> The format for the presentation of variables was adapted from the format used in Kruzich (1980). The idea regarding the creation of an index of robustness belongs to the author, as an obvious extension of Gibbs and Flanagan's (1977) work.

variables. Using Gibbs and Flanagan's typology it is possible to comment on the "robustness" of the variables, i.e. the ability to act as a predictor variable by looking at the number of treatment groups in which the variables demonstrated predictive utility, when compared with the total number of treatment groups in which the use of the variable was attempted.

Neubuerger, Miller, Schmitz, Matarazzo, Pratt, and Hasha (1982) suggested that the absence of a consensus among predictors may be related to definitional issues in a number of constructs associated with the criterion measures of what "constituted successful treatment" (p. 960). Heckler (1983), on the other hand, attributed the absence of consistent findings to the effect of aggregating treatment variables. For example, collapsing nominal or ordinal variable categories to accommodate data analysis designs may hide meaningful relationships between the predictor and criterion variables. A third possible explanation may relate to the use of large heterogeneous samples. Heckler, again notes that such designs may obscure individual differences among specific subgroups (p. 115).

Time appears to be a relevant variable. The shorter the time period, the stronger the association between the predictive variable and the criterion variable. Unfortunately the reverse also holds true. Ritson (1969), in one of the first outcome studies which looked at the effects of aftercare, noted that the frequency of outpatient attendance was closely associated with abstinence at six months and 12 months post-hospitalization. As the period of evaluation is extended however, the "rates of improvement tend to be lower" (Emrick and Hansen, 1983, p. 1081).<sup>14</sup>

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<sup>14</sup> This finding is not too surprising in light of the fact that most aftercare programs are, by definition time limited. See further discussion of this issue.

Kruzich (1980) observed that as the post-treatment time interval increased, "program predictors demonstrated a gradual deterioration in predictive powers" (p. 2) and were replaced by client characteristics which became more important predictors of outcome.<sup>15</sup>

A summary comment regarding the treatment outcome literature would be to suggest that there are no absolutes in terms of response to treatment. In general, treatment is effective for some clients. Some clients are able to utilize aftercare and AA services, and there is a relationship between utilization of these services and remaining abstinent from the use of alcohol. In terms of the literature reviewed, there was not a consistently significant relationship<sup>16</sup> empirically demonstrated between outcome and aftercare or AA participation because an almost equal number of people achieved successful outcome measures with, or without, aftercare or AA. Kolb, Cohen, and Heckman (1981) also noted that many "unsuccessful" problem drinkers continued "to struggle with sobriety and look to AA for help" (p. 204).

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<sup>15</sup> In an earlier study, Adamson et al (1974) made the same observations and concluded that "the outcome of alcoholism depends very little upon the type of treatment, but very much upon the personal and environmental factors pertaining to the individual patient treated" (p. 325).

<sup>16</sup> It is interesting to note that, in addition to equivocal data, there are also equivocal interpretations regarding the significance of the aggregate findings across studies. As an example, Bowen (1987), states conclusively that "available data supports the traditional view of the importance of aftercare services in alcoholism treatment" (p. 267). The author's conclusion would be somewhat different, assuming he has had access to the same studies reviewed by Bowen. This appears to be one example of ideological orientation predominating over the data, in which the conclusions have been bent to fit the model.

## SUMMARY OF AFTERCARE STUDIES

What happens to clients once they complete treatment? Most treatment programs stress the necessity for clients to participate in some form of follow-up services.<sup>17</sup> The majority of treatment outcome research has focused on client variables and treatment program variables.<sup>18,19</sup> "A significant gap in our understanding of alcoholism begins at the point at which treatment ends" (Billings and Moos, 1983, p. 205). Do clients, in fact, actually attend the follow-up services to which they have been referred? Can it be demonstrated that attending these services determines, to any meaningful degree, the clients' posttreatment functioning? The next two sections of this chapter will review the literature related to aftercare and Alcoholics Anonymous programs, two types of follow-up services available to alcoholic clients.

Aftercare, as a generic term, would seem to connote a wide variety of potential services available to clients discharged from treatment centers. In terms of the literature reviewed for this study, the construct has much more limited usage. In the majority of the articles reviewed, aftercare referred to formal, and for the most part time-limited, group-centered

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<sup>17</sup> As will be discussed in more detail in the methodological section of this study, the author conducted interviews of aftercare coordinators selected from a list of the 33 treatment programs whose clients were followed-up by CATOR. In every instance the coordinators reported a policy of specifically encouraging clients to continue attending follow-up supportive services.

<sup>18</sup> It is interesting to note that the relatively few studies which have looked at posttreatment functioning have found that "posttreatment factors account for as much or more variance than does patient background and intake functioning" (Cronkite and Moos, 1980, p. 313).

<sup>19</sup> Emrick (1975), quoted in Kruzich (1980) observed that the "benefit of treatment could not be demonstrated when follow-up intervals extending beyond six months were utilized" (p. 19). This observation would suggest that long term functioning will be determined more by posttreatment variables than by looking for the diminishing effects of treatment over time.

programs offered by treatment centers to help with their clients' reintegration into the community in which the treatment center is located (Chvapil, Hymes, and Delmastro, 1978; Vannicelli, 1978; Galanter, 1984; Powell, Penick, Read, and Ludwig, 1985).<sup>20</sup>

In one of the first studies to look at aftercare, Dubourg (1969) reported on a small (N = 76) sample of alcoholics who had been followed from one to two and one-half years. He found that most clients rejected outpatient care. The majority of clients who were able to maintain adequate posttreatment functioning, did so without recourse to aftercare. The clients who made the most use of aftercare tended to have the worst outcome.<sup>21</sup> Ten years later, in direct contrast to Dubourg's conclusions, Costello (1980) found that aftercare contacts in the first year "improved the adjustments at follow-up and also influenced further aftercare contacts in the second year" (p. 53).<sup>22</sup>

Aftercare has been demonstrated to consistently correlate with abstinence as the outcome measure. In an early study of aftercare, Ritson (1969) found that the frequency of outpatient attendance was closely associated with abstinence. In a more recent study, Ahles, Schlundt, Prue,

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<sup>20</sup> In contrast Kirk and Masi (1978) looked at aftercare programs offered by community mental health centers. Only Dubourg (1969) looked at aftercare in terms of a wide variety of aftercare programs.

<sup>21</sup> Ironically, Dubourg (1969) quoted the Alcoholism subcommittee of the World Health Organization, which at that time was recommending "energetic aftercare to prevent relapse," as the justification for conducting his study (p. 155).

<sup>22</sup> There are two explanations immediately evident to account for the differences in findings between Dubourg (1969) and Costello (1980). The first explanation would suggest that aftercare programs have matured and become more effective, just as the field itself has developed in response to the availability of new information. The second explanation would conjecture that Costello's methodology was certainly more sophisticated than Dubourg's, and hence it was more likely that Costello's design would be more sensitive to looking in the right places and asking the relevant questions. In essence, Costello may have been able to tease out the relationship between aftercare and outcome which was missed by Dubourg.

and Rychtarik (1983) noted that, for the most part, "areas other than abstinence fail to reach an acceptable level of significance" (p. 57).<sup>23</sup>

The timing of the client's attendance in an aftercare program appears to be an important issue when looking at the relationship between aftercare attendance and subsequent outcome. Recent evidence suggests that there may be a strong relationship between successful outcome and attendance in aftercare groups immediately following discharge from an inpatient treatment center. Elal-Lawrence, Slade, and Dewey (1987) found that most relapsers in the first year following discharge tended to procrastinate utilizing aftercare services, or attended only sporadically.<sup>24</sup>

The physical location of the aftercare program may also be an important intervening variable. Vannicelli (1978) noted that aftercare may *only have an impact when it is a direct extension of the inpatient program from which the client was discharged.*<sup>25</sup> Citing their findings that inpatient treatment can "be used as a springboard for continuity of care provided by the same treatment program," Chvapil et al. (1978) looked at an outpatient

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<sup>23</sup> The relationship between aftercare and abstinence is ambiguous, as is the relationship between AA attendance and abstinence. See further discussion in the next section of this chapter.

<sup>24</sup> It is the author's opinion that Elal-Lawrence, Slade, and Dewey (1987) may be confounding variables in terms of suggesting that procrastination in the use of a service and sporadic use are somehow related and reflective of the same dynamic. The author would suggest that the dynamics may be very different. Like sporadic AA attendance, there are a number of possible explanations for sporadic aftercare attendance. The most intuitive explanation for sporadic attendance would be to conclude that it is reflective of a measure of (lower) motivation rather than a direct measure of the identified variable. Second, sporadic attendance has been associated with asking for help, which tends to occur when there are recurrences of active problems which, in turn, could tend to lead to a more negative outcome.

<sup>25</sup> Galanter (1984) concurred with this observation. He found that providing outpatient treatment within a treatment program enhances a "program-wide mutual affiliation," as the outpatient members see themselves as part of the larger group. His findings are subject to many of the same confounding effects reported in other studies. For example, he chose a self-help group format for his control group. As the effect of self-help groups (AA) is clearly confounded with both the effect of treatment and the effect of aftercare, his results must be approached conservatively.

program operated by a treatment facility which accepted direct outpatient referrals from the community, in addition to providing follow-up services for their own inpatient clients. The clients who did not go through the inpatient program did not do as well as clients who had first been treated on an inpatient basis before receiving follow-up services. (p. 543).<sup>26</sup>

Aftercare, as a predictor variable, has been found in several studies to have been unrelated to outcome, usually defined as remaining sober over time. Controlling for the duration of alcoholism, Kirk and Masi (1978) found that receiving aftercare services did not influence readmission rates. Intensity of aftercare services was not significantly related to outcome at a one-year follow-up point (Powell et al, 1985). The "outpatient treatment modality" of aftercare offered by a treatment program was also not associated with outcome (Powell et al, 1985, p. 312). From a different direction Ornstein and Cherepon (1985) looked at aftercare participation as a criterion variable. They were not able to find any significant predictor variables which would predict aftercare participation. Looking at the type of aftercare services offered, Gilbert (1988) did not find any correlation between the types of aftercare and a variety of outcome measures.<sup>27</sup>

One issue which has received a little attention relates to the time-limited factor of aftercare. How much is enough? One estimate of the range of aftercare services can be found in Kirk and Masi (1978). They

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<sup>26</sup> There was significant confounding of the variables in this study. It was not established in Chvapil et al. (1978), that the direct outpatient referral group (receiving services for the first time) was identical on all variables with the exception of mode of referral to the inpatient group receiving aftercare services. Clearly length of treatment, severity of problem, types of treatment are relevant variables which would need to be accounted for prior to reaching their conclusion regarding the efficacy of continuity of service and the importance of aftercare.

<sup>27</sup> In a literature review which accompanied his study, Gilbert (1988) found that minimal aftercare was "no more effective than no aftercare whatsoever" (p. 156).

reported a range of visits from one to 150+ visits with the median being less than six visits.<sup>28,29</sup> Vannicelli (1978) observed that clients who were doing the best tended to drop out of aftercare after a short period of involvement, usually between three and six months. The question quickly becomes one of asking what is a reasonable expectation from such a relatively short period of involvement? For how long a period of time would it be expected that the effect of aftercare could be sustained or measured?

Given the absence of a consistent relationship between aftercare and outcome, one can begin to question whether aftercare should be considered an independent variable.<sup>30</sup> None of the studies reviewed looked at aftercare independently from AA attendance. Intuitively one might predict an interaction between aftercare and AA attendance, just as there may well be an interaction between AA attendance and inpatient treatment effects.<sup>31</sup>

While it is clear from the literature that aftercare is ideologically conceptualized by treatment programs as an important service, the data does not provide a strong confirmation of this view of aftercare.<sup>32</sup> This may

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<sup>28</sup> Ossip-Klein (1984) reports a 50% dropout rate after the first scheduled visit (p. 85).

<sup>29</sup> In an earlier study, Porkorny (1973) found that only 38% of his sample were able to attend between one and three aftercare sessions. 34% never attended and another 28% attended only occasionally (as reported in Pratt, Linn, Carmichael, and Webb, 1977, p. 915).

<sup>30</sup> The data from a variety of studies is equivocal. "Some studies find significant effects of aftercare while others have found no difference in outcome between aftercare participants and nonparticipants" (Finney, Moos, and Mewborn, 1980, p. 18).

<sup>31</sup> As a conjectural aside, from this perspective a case could be made that aftercare does not operate independently from treatment effects but simply represents an extension of the inpatient treatment effect. Aftercare's perceived function as an independent variable could be attributed to the extension of inpatient treatment effects being confounded with AA attendance. Certainly Galanter's observation of the importance of the "mutual affiliation and cohesiveness" generated by physically locating the outpatient program within the inpatient unit speaks to this issue (1984).

<sup>32</sup> Finney et al. (1980) concluded that "preventive aftercare, defined as outpatient therapy and AA, showed few significant relationships with outcome measures" (p. 26). The authors appropriately note that the absence of an observed relationship may have more to do with the lack of sensitivity of their measurement than factors inherent in either the variables or the lack of a relationship between them.



be a particularly relevant observation in terms of the apparent absence of research regarding free-standing aftercare programs operating independently or separately from the inpatient treatment facilities.

### SUMMARY OF ALCOHOLICS ANONYMOUS STUDIES

The history of alcoholism treatment has been well documented elsewhere (Kurtz, 1979; Rorabaugh, 1979 Aaron and Musto, 1981; Kinney and Leaton, 1983; Mendelson and Mello, 1985; and Ames, 1985). With the exception of a relatively short period of time in the 19th century (the early 1840s) when our society was more favorably predisposed towards the treatment of alcoholics, our societal response to persons with alcohol problems has not been very humane.<sup>33</sup> Saxe (1983) notes that until the 1950's, the "treatment for alcoholism was more likely to have been incarceration or custodial care than to have been medical or psychological therapy" (p. 35).

This historical digression is necessary to establish the importance of looking at Alcoholics Anonymous as a support service for alcoholics. Since its founding in 1935, AA has been a dominant factor in the provision of treatment and support services to alcoholics. Many alcoholics have successfully come to terms with their alcohol problems using AA and no other services (Vaillant, 1981; Bowen, 1987). Of equal, if not more importance has been AA's contribution to our theory of alcoholism and alcohol treatment through its informal but persistent espousal of the "disease of alcoholism" by its membership.<sup>34</sup>

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<sup>33</sup> For a good discussion of societal attitudes towards common drunkards, 1800- 1850, see Lull (1986). During the relatively short period of the Washingtonian movement (1840- 1850), many of the precursors to modern treatment were introduced, including such concepts as self-help groups, the necessity for social detox of inebriates, individualized treatment plans, and a dynamic cyclical treatment model (as opposed to a linear and static model).

<sup>34</sup> Kenney and Leaton (1983) properly note that AA has no official definition of alcoholism. Based primarily on the work of Jellinek (1960), many health organizations have found it

According to AA's most recent triennial survey, the U.S. AA membership exceeds 630,000 (AA World Services, 1984). Compared with the estimated 18 million persons with alcohol problems,<sup>35</sup> the AA membership is in a clear minority.<sup>36</sup> Bean (1975) reported that AA claims a "success rate of 75%; 50% on the first approach to AA, and half the first-time failures on their later return to try again" (p. 11/20).<sup>37,38</sup> Regular AA attendance was found to be almost effective as formal inpatient treatment in a chemical dependency program (Clare, 1976, p. 282)

Despite considerable testimonial support for AA, there are only a small number of studies which look at AA participation as the primary focus of the study. (Bebbington, 1976; Henry and Robinson, 1978; and Hoffmann, Harrison, and Bellille, 1983). A somewhat larger group of studies looked at AA involvement as being one component in a multiple regression analysis (Kruzich, 1980; Gordis, Dorph, Sepe, and Smith, 1981; Kolb, Cohen, and Heckman, 1981; Pettinati et al., 1982; Taylor, Helzer, and Robins, 1986; and Elai-Lawrence et al., 1987).

AA presents researchers with several methodological hurdles. As an organization committed to anonymity, it is difficult to engage its membership in any type of research design. Second, its membership criteria are so loosely defined that it is difficult to structurally define group

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expedient to define alcoholism as a disease, illness or syndrome (Vaillant, 1983). The informal acceptance of the disease concept of alcoholism by AA membership predates Jellinek's work. For an insightful discussion of the development of this thinking see Kurtz (1979), pp. 99- 129.

<sup>35</sup> Williams (in press) as quoted by Bowen (1987).

<sup>36</sup> "Only about 5%- 10% of the alcoholics in this country use AA" (Bean, 1975, p. 11/20).

<sup>37</sup> In contrast, based on the results of a number of empirical studies, Miller and Hester (1980) estimated that AA's abstinence rate was between 26% and 50%.

<sup>38</sup> Mendelson and Mello (1985) suggest that we do not "possess the scientific data to either support or refute the relative efficacy of AA for the treatment of alcoholism" (p. 340).

membership. Bebbington (1976) concluded that the "totality of studies regarding AA does not add significantly to the knowledge concerning AA" (p. 572). The third problem regarding AA membership relates to the issue of self-selection. By defining oneself as a member of AA, the client already has some awareness of an alcohol problem and has some degree of willingness to correct the problem. Bebbington noted that the issue quickly becomes one of attempting to separate treatment efficacy from preexisting motivation. Obviously in a correlational design this task is formidable if not impossible.

A number of studies commented on possible theoretical explanations for the claims of a significant "treatment effect" attributed to AA (Bean, 1975; Zinberg, 1977; Beckman, 1980; and Kurtz, 1985). Beckman (1980) described the effect of the group's influence on clients and suggested that AA stimulates "cognitive change which facilitates behavioral change" (p. 717). Kurtz (1985) felt that AA's program directly alters the individual's "narcissistic, grandiose perceptions and assists in the development of a more mature self-concept" (p. 111). Bean (1980) concluded that AA introduces learning theory, resulting in the extinction of drinking while systematically reinforcing sobriety.

Other studies view AA's contribution from the perspective of a self-help group facilitating alcoholics' desires to remain abstinent from further drinking (Leach, 1973; Bebbington, 1976; Robinson, 1979; and Donovan, 1984). Maintaining sobriety involves more than merely attending an AA meeting (Henry and Robinson, 1978). Bebbington (1976) notes that AA attendance involves a "complex process of affiliation of which only a part is related to influences effecting a progression from inebriety to sobriety"

(p. 579). This network of informal relationships extend beyond the formal AA meeting (Henry and Robinson, 1978).<sup>39</sup>

A consistent finding across the relatively few studies which have attempted to empirically look at AA involvement is that, while there is a moderate correlation between AA attendance and abstaining from the use of alcohol, the data suggests that AA is not for everyone. Hoffmann, Harrison, and Belille (1983) found that clients either attend weekly (48%), or they do not attend at all (38%).<sup>40</sup> Likewise, Pettinati et al. (1982) found that only 25% of their subjects were regular attenders, whereas Elal-Lawrence et al. (1987) reported that 33% of their subjects were regular attenders. Given the ideological emphasis treatment centers tend to place on AA involvement, one might expect a larger percentage of clients to have become involved.<sup>41</sup>

As discussed above, there are definite limitations to correlational designs. One concrete example of the effect of this limitation is the difficulty in interpreting the moderate correlation between AA attendance and abstinence which is consistently reported in the literature. The central question is whether AA keeps people sober or whether "sober" clients are attracted to AA and consequently would do well in any case (Gordis et al., 1986, p. 520). Tournier (1979) suggested that the high success rate

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<sup>39</sup> Gellman (1964), quoted in Robinson (1979) sees the "most important aspect of AA as being the socialization process which leads to experiencing AA as a way of life" (p. 35).

<sup>40</sup> Only a relatively small number of clients attend AA on an occasional or sporadic basis (Hoffmann et al., 1983). Both occasional aftercare attendance and occasional AA attendance have been associated with a less successful outcome (Pettinati et al., 1982; and Elal-Lawrence et al., 1987).

<sup>41</sup> Which is, in a sense further confirmation that AA is not for everyone. Zinberg (1977) concluded that despite AA's "relative success with hard-core alcoholics, it does not show great promise for the prevention of alcoholism, and it hardly offers a model for the controlled use of intoxicants" (p. 101).

attributed to AA is the result of clients, whose sobriety is already well established, being attracted to AA rather than any quality inherent in AA or related to a treatment effect associated with AA.<sup>42</sup>

Attempts have been made to further explore the relationship between AA attendance and the outcome variable, which is usually abstinence. For example, Kolb, Cohen, and Heckman (1981), controlling for subjects' ages, found a significant relationship between alcohol consumption and AA attendance. In general, as the effects of other variables were controlled for, the significance of the observed relationship between AA attendance and abstinence decreased markedly. Most of the studies which found significant associations between aftercare or AA attendance and outcome tended not to control for background characteristics (Finney et al. 1980).<sup>43</sup>

A final problem regarding the empirical study of AA involvement relates to issues of conflicting ideology.<sup>44</sup> In the chemical dependency treatment field, ideological lines tend to be rigidly drawn with little dialogue across the lines.<sup>45</sup> The integral issue is a difference in the

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<sup>42</sup> It is the author's opinion that, in part, the intensity of the discussion regarding the efficacy of AA is the direct result of "fuzzy conceptualization." A number of researchers have looked at AA as providing a "treatment effect" Other researchers conceptualize AA as a supportive service to maintain the treatment effect. In the latter case the "treatment effect" can be considered as being the result of either external influences (i.e. inpatient treatment programs) or internal influences (i.e. motivation).

<sup>43</sup> A more conservative, perhaps ominous conclusion is that "the more carefully the patients are scrutinized and the more rigorous the analysis, the worse is the outcome" (Gordis et al., 1981, p. 521).

<sup>44</sup> While recognizing the importance and contribution of AA, Tournier (1979) felt strongly that the resulting belief system contributed to "the rejection of innovative strategies... and the depreciation of possible discovery and implementation of alternative approaches" (p. 237).

<sup>45</sup> A personal conclusion based on 14 years of observations is to note the absence of any sense of sustained dialogue between mental health professionals and alcoholism counselors, the former tending to be theory based while the latter tend to be experientially based. "Many recovered alcoholics tend to be ferociously intolerant of any treatment approach different from what was helpful to them, and rhetoric and an evangelical zeal often supersede dispassionate evaluation of treatment outcome" (Mendelson and Mello, 1985, p. 319).

approach to coming to terms with life issues and a sense about how reality ought to be perceived. The researcher is grounded in the scientific method whereas the "self-help group member is grounded in dogma and faith" (Moore, 1979, p. 330). The self-help group member deals with conflict by resorting to a position of "don't bother me with the facts, I know what works for me." Rosenberg (1979) attributes the ideological conflict to a difference between "scientific and lay approaches to treatment" (p. 331).

To a certain degree new sources of information have led to more sophisticated models which, in turn, have tended to make the ideological debate increasingly obsolete. Over the years improvements in the treatment process have tended to occur incrementally. The appreciation of family systems, multidetermined syndromes, relapse prevention, are examples of new concepts and techniques which have found their way into the alcoholism treatment field. These new techniques and concepts have tended to make the model of alcoholism as a unitary disease with its "all-or-none" solution irrelevant.<sup>46</sup> Clients, professionals and paraprofessional alcoholism counselors are benefiting from this increased knowledge. Consequently one might well expect a mellowing of the dialogue over the next few years.<sup>47</sup>

The "Rand Report" published in 1976, created an uproar when it concluded that controlled drinking might be a realistic alternative, (Armor, Polich, and Stambul). Shortly thereafter, Sobell and Sobell (1978) stirred up the waters another time with their study proposing to teach alcoholics to

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<sup>46</sup> A paraphrase of a conversation with Dr. Norman G. Hoffmann regarding the significance of developments and changes within the alcoholism treatment field.

<sup>47</sup> Kurtz (1985) sees this development as leading to (increased) "cooperation between professionals and AA members involving (more) frequent interaction, (increasingly) congruent ideas about treatment and (the development of) appropriate linking strategies" (p. 110).

become successful social drinkers. A third ideological explosion occurred in 1979 when Tournier suggested that AA's beliefs could possibly negatively influence recovery for clients who did not accept all of their propositions.<sup>48</sup> The repercussion of all of the above has been to create a fairly unstable ideological setting within which the researcher has had to contend with significant methodological limitations. This conflictual atmosphere has been offered as one of the reasons alcoholism research has not progressed further (Kincannon, 1987). As we move further away from the strident confrontations of the late 1970s and early 1980s, one might expect enhanced cooperation to result in a qualitative, if not quantitative improvement in the alcoholism research literature.

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<sup>48</sup> Commenting on Tournier's observations, Demone (1979) placed the issue in perspective noting that it was not realistic to expect an "ideologically based organization to comfortably accept opposing explanations" (p. 335).



### SUMMARY OF SOCIAL SUPPORT AND SELF-HELP STUDIES

This section of the literature review summarizes findings from studies which looked at social support and self-help groups. In addition the author comments briefly on the need for a general model to synthesize findings from a number of disparate research areas. The relative absence of integration among a variety of seemingly associated topics (i.e., self-help, social support, AA, aftercare, pretreatment-treatment-posttreatment predictors of functioning, etc.) suggests, as a topic for further study, the development of a systems model which could achieve this integration and enhance our understanding of alcoholism intervention.

Recent studies have demonstrated that over time alcoholics' experiences with their drinking problems are quite varied (Bromet and Moos, 1977; Pettinati et al., 1982; Billings and Moos, 1983; and McCrady and Sher, 1983). A static, problem -> treatment -> outcome model simply does not do justice to the data. A more comprehensive and dynamic model could be developed which would emphasize the importance of a systems perspective.<sup>49</sup>

Integrating available information from a number of studies, a model using a systems perspective could be developed which would emphasize environmental factors in addition to personal and programmatic factors.

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<sup>49</sup> Having carried out a comprehensive literature review, this writer is not aware of any resources which fully explicate alcoholism intervention from a systems perspective. If this observation is accurate, then obviously this is an area which should be developed. Moos and Finney (1983) do present a brief, "process oriented framework for evaluation of alcoholism treatment" which schematically addresses the issue. Billings and Moos (1983) use path analysis to clarify the relationships among predictor variables as they effect the outcome variable. What is missing is a theoretical model which integrates these kinds of partial pieces of the picture.

For example, extratreatment factors such as "environmental stressors, coping resources, and social resources provide as much information about treatment outcome as patient characteristics and treatment factors combined" (Billings and Moos, 1983, p. 213).<sup>50</sup> More specifically, "stable family environment and work environments" have been demonstrated to correlate with favorable adjustment (Bromet and Moos, 1977, p. 326). In a similar fashion, AA attendance and to a lesser degree, aftercare attendance have been shown to correlate with successful outcome.

A systems model could explicate the relationships among such areas as the development of alcohol problems, the effects of intervention, successful functioning, continued alcohol problems, etc.<sup>51</sup> Marlatt (1985) has suggested that there may be a reciprocal relationship between continued drinking and other life problems. Continued drinking may create additional levels of stress or interfere with the resolution of other life problems. Stress from other life problems may encourage further drinking.<sup>52</sup>

An intriguing hypothesis advanced by Bromet and Moos (1977) ties together Marlatt's observations regarding life problems, stress, and continued drinking with other aspects of the alcoholic's larger social system. An alcoholic's family environment, work environment, AA, and

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<sup>50</sup> As noted earlier in this study, even though extratreatment factors have demonstrated an association with outcome, the majority of the variance in outcome remains to be explained.

<sup>51</sup> One consequence of a static model in describing the course of events in an alcoholic's life is that predictor variables tend to be viewed in terms of either being present or absent. A dynamic model would suggest that the predictor variables may change in terms of their relative importance over a period of time. Kruzich (1980) highlights the differential weighting of treatment effects and personal characteristics as a function of time. McCrady and Sher (1983) hypothesize that the variables mediating relapse may differ qualitatively from the variables which maintain problem drinking (p. 338).

<sup>52</sup> The "persistence of other life problems may be a useful predictor of relapse and may suggest additional intervention strategies" Miller, Hedrick, and Taylor (1983, p. 411).

aftercare, share in common the capacity to intervene as a buffer between the alcoholic and other sources of stress (including continued drinking).

Through its emphasis on changing drinking behaviors to promote abstinence, Moos and Finney (1983) feel that AA provides both a supportive network and a change in group expectations and norms which can act to "foster a less stressful life style" (p. 1041). The resulting lifestyle is hypothesized to reduce the risks of returning to drinking. Galanter (1984) has identified these changes in group expectation as a "resocialization effect" produced by the interaction between "cohesive ties of the membership and consensual beliefs" (p. 22).<sup>53</sup>

Rather than emphasizing a treatment effect, per se, a number of studies have looked at AA from its function as a self-help group providing social support (Levy, 1978; Robinson, 1979; Knight, Wollert, Levy, Frame, and Padgett, 1980; Riordan and Beggs, 1987).<sup>54</sup> The significance of looking at self-help groups in terms of their role in providing social support is, that as a construct, these functions of self-help groups can be neatly integrated into a systems model of recovery.

In one of the first studies to look at social support as a moderator of life stress, Cobb (1976) hypothesized that social support could be defined in terms of specific information communicated from others to the person experiencing life stress.<sup>55</sup> Specifically he defined social support as the

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<sup>53</sup> Continuing in the same vein, McCrady and Sher (1983) suggest that the whole organization of AA is geared to "a reorganization of an alcoholic's social network and a reordering of the alcoholic's interpersonal world" (p. 338).

<sup>54</sup> One advantage of looking at AA from this perspective is that it is an easier task to develop constructs which reflect or measure social support, than it is to develop constructs which represent a hypothesized treatment effect. The underlying issue is one of the level of abstraction required in the basic assumptions upon which a model being developed.

<sup>55</sup> "Others" being defined as friends, family, neighbors, members of a self-help group, acquaintances, colleagues, health care providers, etc. Broadly addressed, the definition of social

information which leads a subject to "believe he or she is cared for, loved, esteemed, and is accepted as a member of a network of mutual obligations" (p. 300). It is the "emotional, affirmational, or informational activities of help giving", which are common to all self-help groups (Biegel and Yamatani, 1987, p. 1197).

The importance of self-help groups can be gauged from the fact that there are now approximately 500,000 self-help groups in the U.S. with an estimated combined membership of more than 15 million (Riordan and Beggs, 1987, p. 427). Self-help groups, as voluntary small group structures, can be influential in terms of assisting individuals in their adaptation to life situations, and in developing coping responses to life problems (Hermalin, Melendez, Kamarck, Klevans, Ballen, and Gordon, 1979; and Katz, 1981, as quoted in Riordan and Beggs, 1987).

A number of studies have looked at social support as a predictor of subsequent outcome. Dimsdale, Eckenrode, Haggerty, Kaplan, Cohen and Dornbusch (1979) noted that there was "increasing evidence that the presence or absence of social supports carried with it certain epidemiological risks and benefits" (p. 175). Holahan and Moos (1981) found an inverse relationship between social support and a variety of indices of psychological distress.<sup>56</sup> Dimsdale et al. (1979) found social support to be

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support could involve a relationship between one or more persons and another person, for the purpose of providing some type of assistance for the latter. A close examination of social support suggests that it can be viewed from a variety of perspectives ranging from very simple to very complex.

<sup>56</sup> Another finding, which is remarkably consistent among all of the studies which have attempted to find measures of social support which predict outcome functioning is that the observed relationships tend to be statistically significant but explain very little of the variance in the criterion variable. The magnitude of the associations is quite low in an absolute sense (Holahan and Moos, 1981, p. 369).

"highly relevant to morbidity and mortality" (p. 179).<sup>57</sup> The predictive value of social support was "less salient among men than among women" (Billings and Moos, 1981, p. 154).

The recent research focusing on social support and self-help groups could be particularly relevant for increasing our understanding of the relationship between AA, aftercare and recovering alcoholics' in terms of their functioning on a number of outcome variables. A number of instruments have been developed and validated which, if used, could provide information about how AA and aftercare function in their social support roles. Synthesizing this additional information with a model using a systems perspective could significantly advance our knowledge regarding intervention and adaptation to alcoholism.

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<sup>57</sup> A particularly intriguing finding, and potentially quite controversial, although not having been identified as such, is Biegel and Yamatani's conclusion that families "requiring assistance in interacting with the patient and learning specific skills for coping with a chronic mental illness are unlikely to receive such assistance through a self-help group" (1987, p. 1197). Certainly this conclusion contradicts the avowed purpose statement of many self-help groups, such as AlAnon, AA, PA (Parents Anonymous), Tough Love, etc.

### SUMMARY OF METHODOLOGICAL CONCERNS

As suggested above, there are significant methodological and design problems evident in the alcohol treatment literature.<sup>58</sup> This section will address a number of specific issues. Treatment outcome studies are, for the most part, passive observational designs. Over the years a large number of correlates of outcome have been explored with varying degrees of success.<sup>59</sup> A significant stumbling block for researchers has been the difficulty in moving beyond correlational analysis to begin to search for causal relationships between the independent and dependent variables.

While clearly being the preferred approach in general discussions of research design<sup>60</sup>, the use of control groups and randomized clinical trials in the alcoholism treatment field has, of necessity, been limited by ethical and practical concerns (Saxe, Dougherty, Esty, and Fine, 1983). The degree to which this is a limiting factor can be seen by the fact that 75% of 2,231 treatment outcome studies reviewed by Goldstein, Surber, and Wilner (1984) did not make use of control of any kind.<sup>61</sup>

The perspective taken towards methodological design and data analysis issues in this study has been to both recognize their inherent limitations as they are currently being addressed, and to acknowledge the

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<sup>58</sup> Crawford and Chalupsky (1977) observe tongue-in-cheek that "alcoholism evaluation, viewed most charitably, appears somewhat lacking in sophistication" (p. 73).

<sup>59</sup> In spite of literally hundreds of studies looking for predictor variables which could explain the variance in outcome variables, the majority of the variance remains unexplained (Cronkite and Moos, 1980; Billings and Moos, 1983; and Booth and Ansari, 1984).

<sup>60</sup> For example, see Babbie (1986) or Kerlinger (1986).

<sup>61</sup> The 2,231 outcome studies involve drug abuse and mental health programs in addition to programs which provide alcoholism treatment services.

importance of a number of creative efforts which have been undertaken to expand the utility of passive, nonrandom, correlational designs. In the absence of experimental and quasi-experimental designs, researchers, using nonexperimental designs have used a number of applications of multiple regression to address relationships among variables.<sup>62</sup>

Table 2: Type of Data Analysis Designs Observed  
In the Review of 54 Treatment Outcome Studies, 1969- 1988

<u>Type of Design</u>	<u>Number of Studies</u>	<u>Percent of Total</u>
1. Bivariate analysis	36	66.7%
2. Multivariate Analysis		
A. Linear Discriminant	5	9.2%
B. Multiple Regression	9	16.7%
3. Other		
A. Cross-Lagged Panel <sup>63</sup>	2	3.7%
B. Path Analysis <sup>64</sup>	2	3.7%
$\Sigma$	54	100%

As passive observational designs, with one exception, all studies reviewed for this study used purposive sampling, without control groups.<sup>65</sup> The search for predictors of outcome is by definition exploratory in nature.

<sup>62</sup> See Pedhazur (1982) for a concise presentation of the rationale for the use of multiple regression in nonexperimental settings as a means of controlling for variance, through the use of partial and semi-partial correlations (p. 98).

<sup>63</sup> Costello (1980) used both and contrasted cross-lagged panel analysis with path analysis.

<sup>64</sup> Path analysis will not be discussed in this paper. In general terms it is one of several data analysis techniques which attempt to address causative inference in passive observational designs (Cook and Campbell, 1979, pp. 295- 340).

<sup>65</sup> Billings and Moos (1983) stands out as a well designed study which used random assignment of controls and their families to look at recovery processes among alcoholics and their families.

As descriptive designs, most of the studies explore relationships among subgroups in their sample in terms of the relationships between one or more predictor variables and selected outcome variables. A number of the studies reported tests of statistical significance and less frequently, measures of magnitude to assess how their findings might differ hypothetically from relationships which could have been randomly generated.<sup>66</sup>

While multiple regression and linear discriminant analysis have been used to statistically control for variance in passive observational designs, cross-lagged panel analysis allows the researcher to begin to comment on the directionality of observed relationships among variables. As a descriptive tool, cross-lagged panel analysis can be used to control for alternative or competing explanations for the observed relationships among variables. Used predominantly in educational psychology, political science, and sociological settings, there are at least two studies which have used cross-lagged panel analysis to discuss the relationship between aftercare and outcome in the alcoholism treatment field (Vannicelli, 1978; and Costello, 1980).

It must be stressed that the results of a cross-lagged panel analysis must be considered provisional in nature rather than confirmatory. Confirmation of any findings in a cross-lagged panel design would await replication through a more rigorous experimental design (Kenney, 1975). It is the author's opinion that the specific merit of a cross-lagged panel analysis is in terms of its being a fairly cost-effective means of

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<sup>66</sup> The use of tests of statistical significance in this manner is the subject of some discussion in the literature and will be addressed in more detail later in this section.



establishing areas for further research for which the substantial increases in costs for an experimental design could then be justified.

The statistical analysis itself may introduce problems regarding the interpretation of the findings. Emrick and Hansen (1983) concluded that specific findings may be "more reflective of the statistical procedures used than a true (measure) of relative predictive strength" (p. 1080). This finding was based on Cronkite and Moos (1978) observation that the first variable entered in a multiple regression analysis will of necessity include shared variance and thus overestimate its contribution. The second and later variables are entered on the basis of "unique, explained variance" and do not reflect shared variance, and hence tend to underestimate their relative explanatory contributions" (p. 1106).

*Violation of statistical assumptions, for the most part, are simply not addressed in the literature, either in the professional journals, or more surprisingly, in doctoral dissertations. A common problem for resolution is the issue of the assumption of the normal distribution. The normal distribution of subjects along the variables under study is considered "necessary" for multiple regression and many of the tests of significance and measures of magnitude reported in the literature.*

Two variables for which this discussion has immediate relevance are the age and gender distributions of alcoholic subjects.<sup>67</sup> Abusive drinking patterns and associated alcohol problems are not distributed normally but tend to be concentrated in younger adults (Mendelson and Mello, 1985;

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<sup>67</sup> A number of studies have shown that elevated mortality for alcoholics is not uniform for all age groups. "Death rates for younger alcoholics are elevated to a higher degree than death rates for older alcoholics" (Polich, Armor, and Braiker, 1981, p. 115).

Cahalan, 1987). Males<sup>68</sup> are significantly overrepresented which has led one researcher to comment that alcohol problems might be more appropriately characterized as problems of young males in their twenties and early thirties.<sup>69</sup>

The conspicuous absence of discussion regarding the violation of statistical assumptions suggested to the author that the issue was far from dormant and remains to more effectively be addressed by the research community. The strongest rationale for the use of multiple regression with data which violates assumptions regarding the normal distribution of data were expressed by Pedhazur (1982) who reported that it has "been demonstrated that regression analysis was generally robust in the presence of departures from assumptions, except for measurement errors and specification errors<sup>70</sup>" (p. 34).

The relative effectiveness of multiple regression has been commented on by Ghiselli (1983) who suggested that a "correlational regression approach was superior to clinical observation in terms of predicting outcome" (p. 651). In either case, the recommended guidance would be to proceed cautiously and conservatively in the interpretation of the findings. This last point is particularly germane given the purposive sampling and comparison of nonrandom subgroups in the multiple regression

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<sup>68</sup> In contrast, a conservative estimate of the "number of women with alcoholism and alcohol related problems has been estimated to be about 20% of the total number of alcoholics in the United States" (Beckman, 1975 as quoted in Mendelson and Mello, 1979, p. 93).

<sup>69</sup> A paraphrase of an informal comment by James Kincannon during classroom discussion, in Public Health 5047: Intervention/ Secondary Prevention of Drug Abuse in Adults, Spring Quarter, 1987.

<sup>70</sup> Specification errors involve the inappropriate use of models, e.g., a linear model to explain data which is clearly nonlinear (Pedhazur, 1982, p. 34).

designs reviewed for this study. In a majority of the studies reviewed the appropriate level of generalization would have to remain within the sample.

The discussion so far has focused on the search for predictor variables. There are, however, issues regarding the choice of criterion variables to be used as measures of outcome. The first issue relates to the efficacy of using sobriety (abstinence from alcohol) as a measure of outcome. Goldstein et al. (1984) reported that more than half of the studies used measures of alcohol usage as the "sole outcome indicator" (p. 488). This perspective is certainly consistent with an AA model of treatment which views the cessation of drinking as the immediate goal. From the perspective of AA, the maintenance of sobriety could appropriately be considered a measure of successful outcome.

The problem with using alcohol usage or abstinence as the only criterion variable is that this variable has not been shown to consistently correlate with improvement in other areas of functioning (Finney, Moos, and Mewborn, 1980; and Babor et al., 1988). The empirical data are confusing which has resulted in contradictory conclusions regarding the relationship between sobriety and other behavioral outcomes <sup>71,72</sup>

The underlying issue is the recognition of the concept that the majority of life's problems tend to be multiply determined. Consequently simply establishing a state of abstinence from alcohol "cannot be expected

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71 Billings and Moos (1983) report a positive relationship between "controlling drinking and functioning in nondrinking areas" (p. 213). Kammeier and Conley (1979) found a strong association between "relative abstinence and good personal adaptation for recovering alcoholics" (p. 115). In contrast, Bromet and Moos (1979) found that there were few meaningful differences between abstaining and moderate drinking alcoholics (p. 187).

72 Babor, Dolinsky, Rounsaville, and Jaffe (1988) concluded that "the evidence does not clearly support either the unitary (abstinence only) or multidimensional approaches to the characterization of treatment outcome" (p. 168).

to result invariably in across-the-board improvement" in all of the related problem areas (Finney et al., 1980, p. 26).<sup>73</sup> At the same time that researchers were calling for a variety of outcome measures it should be noted that treatment outcome studies have not found substantial correlations between treatment effects and other measures of outcome. Thus, it was somewhat ironic that Singer (1983) called for the use of multiple outcome measures because changes due to treatment effects in other areas might have been missed or not substantiated (p. 1145). In some respects this call for multiple outcome measures appears to be somewhat of a statement of faith.

The absence of significant relationships between treatment effects and other measures of outcome may well be related to the issue of the use of *global assessments* rather than *specific measures of change*. Global assessments, such as improvement in health, employment status, or marital functioning require someone, whether it is the researcher or the client, to make a judgement or express an opinion about whether the relevant category has been achieved. The crux of the matter becomes one of appropriately specifying the particular criteria for making the determination. Along with the selection of appropriate criteria, are the related issues of sensitivity of criteria, and the reliability of their application across researchers. In a word, many of the problems with alternative outcome measures are the

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<sup>73</sup> Clare (1976) notes that the idea that the "achievement of abstinence will necessarily produce an amelioration of the alcoholic's problems is being seriously challenged" (p. 279). Similarly Emrick and Hansen (1983) state that "because of the nonorthogonal relationships among outcome domains, the use of multiple measures is essential" (p. 1084). Arguing from an opposing viewpoint, Costello, Baillargeon, Biever, and Bennett (1980) observe that as "abusive drinking becomes integrally involved in a lifestyle that has various negative social characteristics along many dimensions, and that a change in the abusive drinking pattern will effect a positive change along these other dimensions" (p. 228).

Inappropriate, insensitive measures of outcome which are used in a fashion which prevents replication of findings from one study to the next (Gibbs and Flanagan, 1977).<sup>74</sup>

While a portion of the reliability of a measure is directly related to its specificity (Carmines and Zeller, 1979), more pragmatic concerns are also in operation. For example, changes in physical or emotional health status are difficult to measure in the relatively short time frame of most studies. Having successfully completed an inpatient treatment program, it might be expected that a client's health might not deteriorate immediately upon the resumption of drinking. Similarly, other criterion measures occur with such relative infrequency that it is difficult to obtain a large enough sample to be able to address changes in certain behaviors, such as driving while intoxicated arrests or other types of legal problems.

Schuckit, Schwei, and Gold (1986) found that treatment outcome was more successfully predicted using complex scores rather than the single criterion measures. "Emotional, vocational, physical, interpersonal and social outcomes are all relevant but often neglected" domains from which creative composite measures could be developed (Goldstein et al. 1984, p. 482). Parenthetically, it should be noted that an important next step would be to validate the efficacy of the composite measures of outcome through replication of findings prior to concluding that the measures were, in fact, significant expressions of outcome behavior.

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<sup>74</sup> Emrick and Hansen (1983) note that the "size of an outcome figure often is dependent on the criterion selected for evaluation, how the criterion is defined, and how it is measured" (p. 1081). Variation in performance results from these issues rather than true differences in treatment effectiveness (p. 1081).

The articles reviewed for this study appear to have placed more emphasis on the search for predictors of outcome than on developing alternative criterion measures of outcome. In part this may be a consequence of not questioning underlying assumptions of a model. Rohan (1970), quoted in Costello et al. (1980), suggested the problem was one of overly rigid thinking in which "abstinence was equated with adjustment and return to drinking was equated with maladjustment" (p. 224). As a summary comment on the relationship between sobriety and other outcome measures, Pattison (1966) observed that while abstinence was an important variable, it was not a "sufficient criterion upon which to measure the success of treatment intervention."<sup>75</sup>

Researchers have tended to focus on alcoholics in treatment programs, because of their relative availability and the ease with which, as a group, they may be identified. It is assumed that, with rare exceptions, persons undergoing treatment for alcoholism are in fact properly identified as alcoholics. Studying untreated alcoholics in the community presents numerous methodological problems which will not be addressed here.<sup>76</sup> The intriguing temptation for researchers is to want to ask how representative are their samples of alcoholics in treatment when compared with the general population? The issue is that the question cannot be answered due to the significant limitations in generalization noted above.

According to Mendelson and Mello (1985), based on preliminary data from an epidemiological survey sponsored by NIMH, the "best estimate is that approximately 10 million Americans will experience alcoholism

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<sup>75</sup> As quoted in Costello, 1980, p. 224.

<sup>76</sup> See Schuckit (1985) for a good overview regarding epidemiological approaches to the study of alcoholics and alcoholism within a natural community.

sometime during their lifetime (p. 277). The size of the affected population was consistent with Emrick and Hansen's earlier estimate of 9- 13 million Americans experiencing problems with alcohol abuse or alcohol dependence.<sup>77</sup> The problem for the researcher is that only a very small proportion of alcoholics ever go through treatment. Emrick and Hansen (1983) estimated that less than 10% ever receive formal treatment. Obviously, all the treatment outcome studies are narrowly focused on a relatively small subgroup of the total population of alcoholics. Even with appropriate sampling designs to allow for wider generalization, we simply do not have a very clear picture of what happens to the more than 90% of alcoholics who have never entered formal treatment.<sup>78</sup>

Heckler (1983) stressed the importance of the development of the *emerging model which appreciates the heterogeneity of alcoholics and takes into consideration the interdependent and multi-determined nature of alcohol problems*. The research field is moving farther away from the AA model of alcoholism as a unitary phenomenon.<sup>79</sup> Schuckit et al. (1986) recommend looking at diagnostic subsets of alcoholics. More sophisticated means of data analysis will be called for as it becomes increasingly apparent that existing methods are not adequate to deal with the complexity of the relationships of variables among alcoholic populations. For example, Cronkite and Moos (1978) estimate that 23% - 40% of the total explained

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77 As defined by the Diagnostic and Statistical Manual of Mental Disorders, (3rd ed.) of the American Psychiatric Association.

78 A landmark exception to this observation is Vaillant's (1983) 40 year prospective study of males in Boston. In his prospective study, Vaillant was able to follow subjects who developed alcohol problems, whether or not they were identified for treatment.

79 Even in a unitary model, the "interrelationships among sets of variables may change with the type of independent variable and outcome criterion used in a study (Cronkite and Moos, 1980, p. 315).

variance is shared between "patient- related and program-related variables" (p. 1118).

What happens when environmental or extra-treatment variables are added into the picture? Unfortunately, the use of sophisticated data analytic techniques which might have addressed these issues have been limited by the relative quality of the data. Clearly, it seems imperative that high quality research will require additional investment of resources if we are going to extricate alcohol treatment research from its present mediocre level of functioning in which it appears to be "stuck." A sustained commitment of time, staff, and resources are a prerequisite to the design of high quality prospective studies.

In some respects research issues can be categorized by those studies which test hypotheses using as rigorous designs as possible, and other studies which attempt to generate new understanding regarding theoretical issues of the subject of study. The latter have tended to be somewhat subsumed by the former in the search for experimental methods to enhance the generalizability of findings. Recently Donovan, Kivlahan, and Walker (1986) have made a strong case for using "a posteriori" correlational approaches to explicate theoretical relationships, which can later be subjected to more rigorous designs during the theory testing stage. Their argument supports the larger concept of grounding theory in the data, using statistical techniques to guide decisions regarding the significance and importance of the relationships observed in the data.



### VALIDITY AND RELIABILITY ISSUES

There are four validity and reliability issues discussed in the literature which are considered timely for this study:

- A. self-reported data.
- B. data reliability.
- C. secondary data.
- D. external validity.

In general, the discussion generated in the literature has led to a consensus of opinion. In several instances contradictory findings were noted and are reported in this review. As relevant, the author will describe in this section how this study approached the specific issue under discussion.

The issue of the validity of self-reported data was integral to this study. While a number of stereotypic images can be called up to highlight the significance of the issue,<sup>80,81</sup> most of the research in the alcoholism treatment field "hinges on the accuracy of these reports" (Watson, Tillieskjor, Hoodecheck, Pucel, and Jacobs, 1984, p. 344). There are four problems which have been identified with self-reported data: conscious dishonesty on the subjects' part, the effects of denial, the immediate

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80 "Clients were viewed as socially deviant and there is a general suspicion that they may provide distorted information" (Kruzich, 1980, p. 27). The author was not able to find any studies which addressed the presence or frequency of negative stereotypes about alcoholics in the general public's mind (or clinicians' minds for that matter).

81 Caetano (1987) suggested that there "is still a great deal of ambiguity in the public's mind as to whether alcoholism is a disease or a sign of moral weakness" (p. 154).

effects of intoxication, and the long-term effects of organic impairment due to alcohol consumption.

Conscious lying has been addressed by correlating self-reports with collateral reports from a variety of sources ranging from spouse to employer and therapist. The degree of correlation depends on the specific area to which the question is being addressed. Overall, no evidence was found to suggest that alcoholic clients, when taken as a group, consciously lie.<sup>82</sup> What was found, however, is that there does appear to be a strong directional bias in the answers to questions about alcohol consumption. In general, when compared with collateral reports, there was a clear trend for alcoholics to underreport consumption.<sup>83</sup>

In behavioral areas other than drinking, reasonable concordance between alcoholic self-reports and collateral interviews were noted. Watson et al. (1984) concluded that "alcoholics are unlikely to hide undesirable information" (p. 345). Several studies report that self-reported data for non-drinking items tend to be reported accurately (Sobell and Sobell, 1978; Maisto, Sobell, and Sobell, 1979; Sobell and Sobell, 1981; Watson et al., 1984)<sup>84,85</sup>. When differences between subject and collateral

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<sup>82</sup> An example of the absence of consensus can be demonstrated by Goldstein, Surber, and Wilner (1984) who concluded that "self-reports are open to question given the stigmatized behavior in question as well as the client's desire to please" (p. 482).

<sup>83</sup> It should be clearly noted, however, that the underreporting of consumption is not a problem unique to alcoholics. General population studies have found the same phenomenon, where the mean alcohol intake is grossly underreported (Poikolainen and Kärkkäinen, 1985). In the general population, the relationship between actual drinking and self-reports is curvilinear - reasonably accurate for light and moderate consumers but greatly underreported for heavy drinkers" (Popham and Schmidt, 1981, 358).

<sup>84</sup> With the exception of lower scores on the Michigan Alcoholism Screening Test (MAST), Leonard, Dunn and Jacob (1983) found significant agreement between alcoholic men and their spouses in a variety of other areas.

<sup>85</sup> Freedberg and Johnston (1980) found high levels of agreement between subject, spouse, and counselor in terms of self-reports in changes in the subjects drinking behavior.

self-reports were found, they tended to either present no pattern, or were in a direction where the subject presented him or herself in a more negative light than the collateral interview (Pollich, Armor, and Braiker, 1980; Sobell and Sobell, 1981)

Denial, as a hypothesized psychological defense, has been reported in the literature as the means by which the alcoholic is able to deny the reality of alcoholism (Bean and Zinberg, 1981; and Metzger, 1988). It is interesting to note, that none of the studies reviewed considered the possible relationship between denial and the validity of self-reports.<sup>86,87</sup> It is reasonable to suggest however, that if such a psychological phenomenon were operating, it could be addressed by the same procedure of comparing subject self-reports with a variety of collateral reports.<sup>88</sup>

Acute intoxication does appear to have an effect on the validity of self-reported data. One recent study found that heavy drinkers tend to underestimate the amount of alcohol consumed (Maisto, Sobell, and Sobell, 1979). The intoxicating effects of alcohol also were offered as one reason for the curvilinear relationship noted in population study reports of alcohol

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<sup>86</sup> The absence of the issue in the discussion of validity of self-reports is even more surprising given the degree to which "denial" is considered to be pathognomonic of alcoholism by the alcoholism treatment community. From the author's perspective it is exceptionally ironic in that the diagnosis of alcoholism in most instances is based on clients' self-reported history.

<sup>87</sup> On the other hand, one might expect a general reluctance among empirically based researchers, who have undertaken the majority of the validity studies, to attempt to validate an hypothesized unconscious phenomenon.

<sup>88</sup> An alternative explanation for why denial would not necessarily effect self-reported information was offered by Dr. Norman G. Hoffmann, Executive Director of CATOR, in an informal conversation with the author. Denial, as it relates to alcoholism, is denial of the problem. Not seeing a problem, the active alcoholic would not be able to see the connection between amount and frequency of alcohol consumed and the resulting diagnosis, and hence, would be more likely to report accurate information than the social drinker who was embarrassed about how much he may have consumed. For relatively naïve alcoholics this position was consistent with the author's clinical experience. For alcoholics who have "been around the block a few times," conscious dishonesty was more of an issue than denial.

consumption discussed above. The heavy drinkers do not remember with clarity the actual amounts consumed. Underreporting was "most pronounced among subjects whose drinking was described by collaterals as uncontrolled" (Watson et al., 1984, p. 348).<sup>89</sup>

The effect of chronic organic impairment secondary to alcohol consumption on self-reported data appears to be self-evident. Collateral interviews offer a means of checking the validity of such self-reports. A common method reported in the literature for dealing with this issue was simply to exclude subjects with obvious organic impairment. The problem with this approach is that excluding chronically impaired subjects to improve the validity and reliability of the study, has the net effect of inflating the success rate of the remaining subjects in the study (Moos and Bliss, 1978).

The majority of the questions used by CATOR are concerned with nondrinking behaviors. Two CATOR-III questions used in this study involve self-reported information about drinking behavior. The first question addresses frequency of alcohol consumption (five categories from never to daily) and the second question addresses the number of months of abstinence experienced per reporting period.<sup>90</sup> With the possible exception of the two questions related to alcohol usage, the literature review would suggest that the self-reported CATOR-III data used in this study would be

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<sup>89</sup> Kruzich (1980), noting that correlations between self-reports and blood alcohol concentration tests (BAC) are still reasonably high (ranging from 0.55 to 0.70) that the self-reports of actively drinking subjects may be considered acceptable (p. 29).

<sup>90</sup> On the other hand, having only one measure of alcohol usage can be considered a limitation in the construct validity of this study in terms of the potential for "mono-method bias" (Cook and Campbell, 1979, p. 66).

reasonably accurate, with some tendency for the clients to portray themselves more conservatively than may actually be the case.

The validity of the CATOR-III data have been previously addressed by Hoffmann and Harrison (1986). They noted that "Interviewers asked questions regarding specific behaviors rather than framing the questions in such a way as to require a judgement, attitude, or opinion" (p. 48). Research has shown that questions which request specific information tend to elicit reasonably accurate information, even when it is of a sensitive nature (Sobell and Sobell, 1978). Second, CATOR "routinely selected a small random sample of cases and interviewed both subjects and a significant other" to establish the validity of the CATOR-III data (Hoffmann and Harrison, 1986, p. 49)

For the most part, reliability estimates in the alcoholism treatment field are not undertaken. When done, a discussion of reliability is most often blended with the discussion of validity issues (Armor et al., 1976; Kruzich, 1980).<sup>91</sup> The studies which have looked at the issue of reliability of findings have tended to focus on relatively short follow-up intervals between test-retest of specific instruments, ranging from six weeks to three months (Guze and Goodwin, 1972; Sobell, Sobell, and Vanderspek, 1979). Noting the limitations inherent in any study of reliability, Shuckit (1985) concluded that the "reliability of most alcohol related studies was relatively high, and that distortion of results occurring from decreased reliability did not show a definite pattern" (p. 13).<sup>92</sup>

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91 "Probably no issue is more debated among behavioral scientists and studied less...than reliability" (Armor et al., 1976, p. 141).

92 While test-retest measures are more relevant for assessing the ability of instruments to produce the same results across time, collateral interviews can also be used to establish the reliability of self-reported data across time (Babbie, 1986, p. 109)

The reliability of the CATOR-III data was enhanced by several procedural techniques. Interviewers received initial and periodic update training to ensure that data were being collected according to CATOR procedures. Telephone interviews were conducted from precoded questionnaires. All questions were field tested in pretests prior to inclusion in the CATOR interview to ensure that the intent and wording of the questions were clear and unambiguous.<sup>93</sup> All data were manually checked for completeness and accuracy prior to being entered into the computer system. The data were entered into the computer two times and were verified. The data entry program had a preset range of data parameters and flagged violations for future reconciliation. There was a specific CATOR protocol to be followed for the reconciliation of identified data-verification violations. A conservative approach was used, and when the violation could not be reconciled the data were thrown out. The precoded telephone interview forms were color coded to insure proper collection and entry for the appropriate time interval.

The positive aspect of a secondary data analysis is having access to a very large data pool. This allowed for a much richer description of the variables and their relationships than could be accomplished in a smaller sample, collected for the specific purpose of addressing the research question under consideration.<sup>94</sup> The financial constraints simply would not

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93 Details of the interviewer training procedures summarized from a conversation with Patricia Ann Harrison, CATOR Research Coordinator, Summer Quarter, 1986.

94 A potential problem with secondary data analysis is that generalization of the results is often totally dependent upon the design of the primary data collection, procedures over which the researcher conducting the secondary data analysis has no control.

allow an individual researcher to collect the quantity and quality of data which was already available as part of the ongoing efforts at CATOR.<sup>95</sup>

A potential drawback to a secondary data analysis, is that the researcher has to work within the limitations of the primary data as it exists. For example, one might wish that the CATOR-III data had included more items related to the variables of interest for this study and explored them in more detail. The issue becomes one of constructing a connection or bridge between the researcher's conception of his interests and the available data. The validity issue becomes one of assessing the degree of fit between the collected data and the variables which the researcher wished to study. The creativity of a secondary data analysis becomes evident in the design of an analysis which allows the researcher the opportunity to address specific concerns within the limitations imposed by the primary data.

As discussed in the last section, the sample of CATOR-III subjects used in this study was purposive in nature, limited to those clients for whom complete data were collected at all four data gathering points to obtain maximum understanding of the relationships among the variables being studied. It can be expected that the amount of motivation required to provide extensive follow-up data over a two-year time period would probably act to differentiate this sample from other potential CATOR-III subsets which could include clients for whom some, but not all data were available.

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<sup>95</sup> As an example, according to CATOR's Executive Director, to generate a comparable data set would cost an estimated \$150,000.

External validity was limited in terms of any substantial generalization of the results to other samples. The large and rich data set provided a heterogeneous sample of relatively high functioning subjects from many different situations and circumstances in the upper midwestern United States.<sup>96</sup> While acknowledging the limitations regarding generalization which were discussed earlier in this study, it should be noted that the CATOR-III data presented in this study were probably more representative of mainstream American experiences with aftercare and AA than the majority of studies cited in the literature review.<sup>97</sup>

The sampling procedure clearly limited the external validity of this particular study. The stated purpose of the design was to take advantage of the rich data set and explore relationships among variables within the sample. In this instance a decision was made to maximize available information at the expense of generalizability. Based on the findings of this study, another sample could be randomly selected from the CATOR-III data pool to both replicate these findings and extend the generalizability of the study.

This study has extended our understanding of the relationships among variables and has established that the research questions were important and should be extended to other samples both within and beyond the CATOR population (Bogdan and Biklen, 1982).<sup>98</sup> The results of this study were

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<sup>96</sup> The 33 treatment facilities were located in 12 states, from which the clients were discharged, provided a broad spectrum of treatment experiences for the clients.

<sup>97</sup> It should be clearly understood that this conclusion refers to descriptive commentary about the sample itself, rather than any suggestion that inferences based on this study can be applied to other samples (if there were any) with similar demographic characteristics. In this regard the cross-validation of the multiple regression findings is particularly germane in that the cross validation does act, in some respects, as a replication of the original findings (Kenney, 1975).

<sup>98</sup> "Based on the assumption that human behavior is not random or idiosyncratic, some (qualitative) researchers do not think of generalizability in the conventional way. They concern



particularly applicable to a discussion about generating theory, grounded in empirical data rather than ideology.

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themselves not with the question of whether their findings are generalizable, but rather, whether the question under study is generalizable to other settings and subjects " (Bogdan and Biklen, 1982, p. 41).

### CHAPTER THREE: CENTRAL RESEARCH THEME, INTRODUCTION TO THE VARIABLES, AND RESEARCH QUESTIONS

#### OVERVIEW

This chapter is divided into three parts. The first part presents a concise statement of the central research theme of the study. A model is presented in Figure 1 which shows the expected relationships among the study variables and serves to guide the analysis of the CATOR-III data. In the second section of the chapter, the test (predictor), outcome, and control variables are introduced. Based on the model of hypothesized relationships among the study variables, the third section sets out the specific research questions<sup>1</sup> which will be addressed in the analysis of the CATOR-III data.

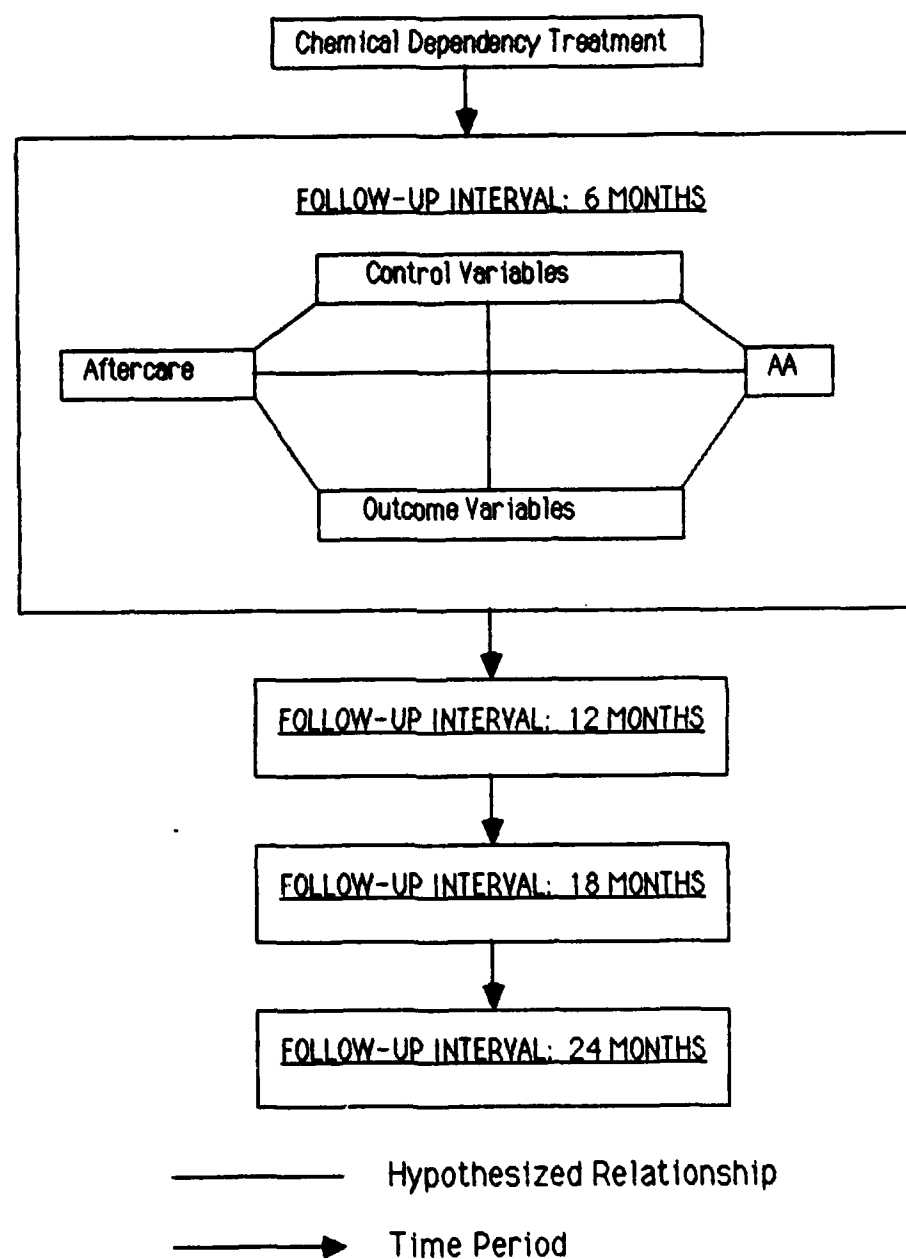
#### CENTRAL RESEARCH THEME

This study was concerned with exploring relationships between AA attendance and aftercare attendance and their correlation with selected outcome variables, measured longitudinally at six-month intervals for two

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<sup>1</sup> The eight research questions suggested specific null hypotheses which will be addressed in detail in "Chapter Six: Discussion." The critical values for rejecting the null hypotheses using the appropriate tests of statistical significance (either the Chi Square Test or the F-Test, depending on the level of the data) will be discussed in "Chapter Four: Methodology".

Figure 1: Heuristic Model Explicating Hypothesized Relationships Among the Test, Control, Time and Criterion Variables



years following the subjects' discharge from inpatient chemical dependency treatment programs. Did the subjects attend the social support resources to which they were most likely referred, and did this attendance correlate with their outcome performance?

A review of the literature suggested that researchers have tended only to be interested in the correlation between the inpatient treatment program efforts on behalf of the client, and subsequent changes in drinking behaviors (Emrick and Hansen, 1983). It has only been in recent years that other outcome variables have been examined as the differential effect of alcohol problems across relatively independent functional dimensions has begun to be appreciated.<sup>2,3</sup> The effect of the posthospitalization social support resources on outcome functioning, independent from the treatment effect provided by the inpatient treatment experience, for the most part, has not been studied.

A number of the studies cited in the literature review used a cross-sectional design to obtain a "snapshot" of what was occurring at a particular point in time for a group of clients. A substantially smaller number of studies used a longitudinal design but tended to have only two

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<sup>2</sup> The studies cited in the literature note that the search for other outcome variables was directed by two factors. The first influencing factor was the recognition of the relatively low percentage of variance accounted for by existing outcome variables. The second factor influencing this search was the observation that a change in drinking patterns did not necessarily correlate with improvement in other areas, such as health or employment.

<sup>3</sup> It is the author's opinion that, with the exception of sobriety as an outcome variable, the research community has yet to demonstrate that alcoholism treatment and other outcome variables are correlated in any significant and consistent manner. Alternative outcome variables make intuitive sense from a multidetermined, multidimensional model of alcoholism. The problem is that the research strategies as of yet are probably not sophisticated enough to identify and separate the various components which contribute to successful outcome functioning in the recovering alcoholic.

data collection points (e.g, most commonly, 6-months and 12- months). This study will expand on the earlier work by looking at the relationships between test and outcome variables in six month increments, i.e., at 6-months, 12-months, 18-months and 24-months.

Figure 1 graphically shows the relationships between the four types of variables examined in this study for the first (6-month) time period. A straight line is used to indicate hypothesized correlative relationships. The arrows refer to the passage of time. The relationships among the variables are assumed to operate in a similar fashion for the remaining three time periods (12-months, 18-months, and 24 -months). Both the outcome variables and the control variables were selected on the basis of either previous research conducted by others or the author's clinical experience.<sup>4</sup> The element of time is incorporated into the design by analyzing the relationships among the variables within each of the six-month time intervals. For obvious reasons CATOR-III definitions of all of the variables are used in this study.<sup>5</sup> Appendix A lists the CATOR-III items and definitions which correspond to the study variables.

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<sup>4</sup> The original motivation for selecting the variables was primarily based on the author's clinical experiences. A review of the literature provided further justification as all of the variables had been addressed in previous research.

<sup>5</sup> As discussed earlier in this study, a secondary data analysis must work within the constraints provided by the primary data source.

### INTRODUCTION OF THE STUDY VARIABLES

Table 3 lists the specific variables examined in this study in terms of the four categories into which they were placed in the model. AA attendance and aftercare attendance were identified as the two predictor (test) variables which were correlated with the control variables and the outcome variables. Clinical observation of clients who attend AA on a frequent basis would suggest that AA functions as a self-help group. This role of AA functioning as a social support system has been documented in the literature.

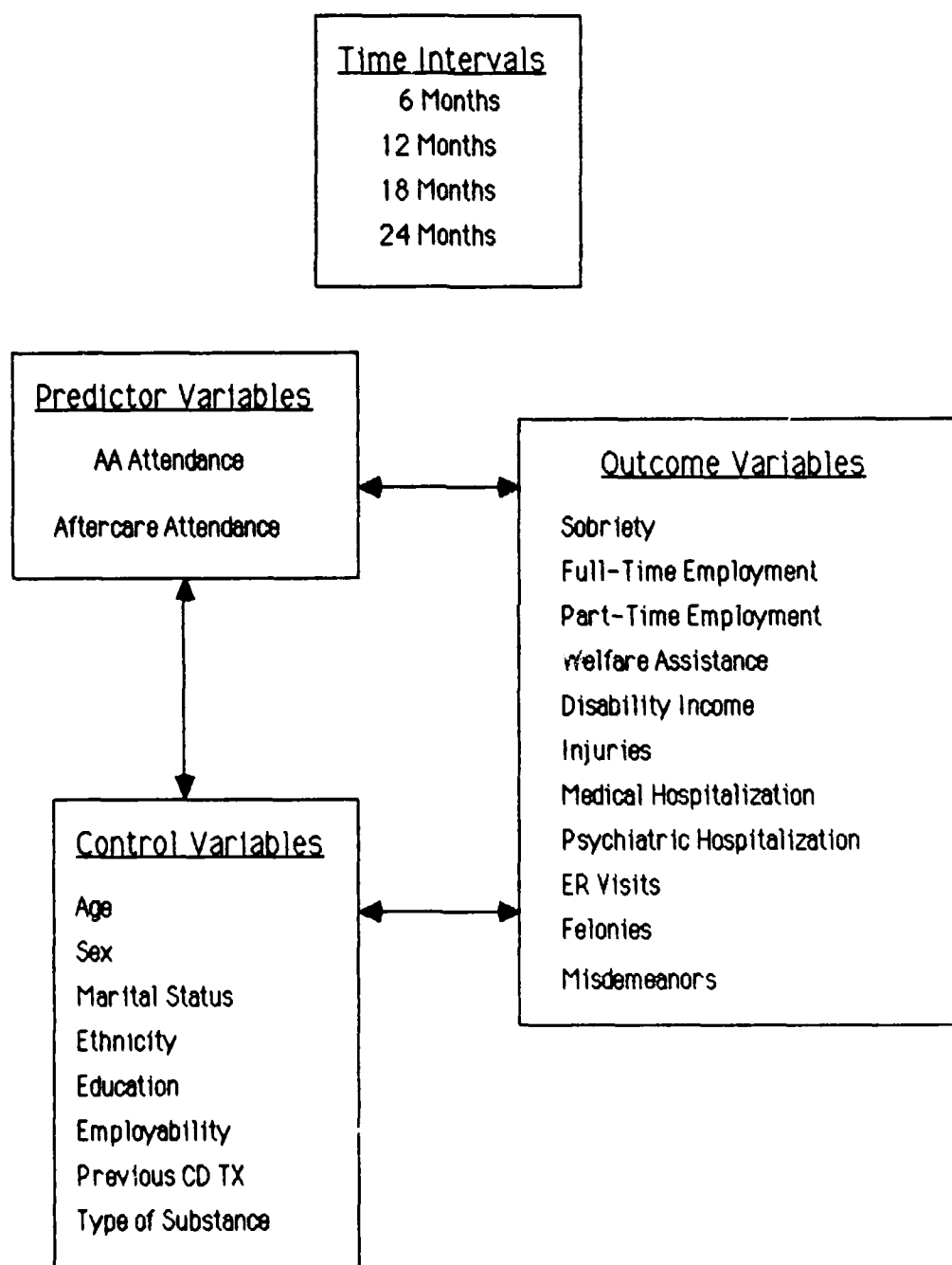
An important part of an aftercare program involves educating clients to make appropriate use of a broad range of health services and community support services. Although not as clearly defined in the literature, it was apparent that aftercare provided temporary social support in addition to its primary role of facilitating the transition from inpatient programs back to the community. Consequently one might expect to see similarities in the relationships between the two predictor variables in their correlation with the outcome variables..

Current research suggested that several other variables may differentially influence the clients' receptivity for, or ability to attend, aftercare services or AA.<sup>6</sup> For example, AA, as a support group, has tended

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<sup>6</sup> With the possible exception of Jindra and Forslund (1978), a qualitative, ethnographic survey of AA membership to explicate system dynamics of the AA meeting remains to be done. The AA meeting is important because it becomes the hub of an important extended social network for recovering alcoholics. See Robinson (1979) for a theoretical discussion of the functions of an AA meeting.

Table 3: List of Specific Variables Examined in This Secondary  
Analysis of the CATOR-III Data



to be thought of as a predominantly middle-aged group of males.<sup>7</sup> Table 4 presents selected results of the last three AA World Services surveys of their own membership. AA's data appears to support the observation that age and gender are two variables which could have an influence on AA attendance rates.

In addition to age and gender, the six other control variables identified in this study may influence outcome, perhaps confounding the relationships between the aftercare and AA variables and the outcome variables. By taking into account the potentially confounding variables, the relationships between the test and outcome variables were more clearly ascertained.<sup>8</sup> This study looked at the correlation between the control variables and individually, the test variables and selected outcome variables which correlated with the test variables. In a later step of the data analysis the control variables were entered into multiple regression equations, and a discriminant analysis equation.<sup>9</sup>

"Employability" and "type of substance" are two control variables which require further clarification. "Employability" is a variable which is a dichotomous classification of subjects at the beginning of their Inpatient

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<sup>7</sup> It is the author's impression that AA might also be characterized as a predominantly white group. AA World Services does not report ethnic make-up of their membership. Access to medical and support services have been demonstrated to be effected by social class and ethnic differences (Westermeyer, 1982).

<sup>8</sup> Another way of making the same point is to consider that all of the subjects in this study completed inpatient treatment programs and controlling for individual differences would begin their posthospitalization experiences on equal footing. The control variables would be eliminated as possible explanations for any observed differences in outcome functioning, leaving only the predictor variables and probably one or more unknown variables. Following this line of thought, the relevance of an experimental design is increasingly apparent.

<sup>9</sup> An alternative approach to the analysis of relationships among three groupings of variables would be to consider analysis of covariance. From the author's perspective, the combination of bivariate analyses and multiple regression provided a more naturally intuitive route for explicating the relationships among variables.



Table 4: Selected Demographic Characteristics  
of Alcoholics Anonymous, 1977- 1983.<sup>10</sup>

<u>Demographic Characteristic</u>	<u>Percent of AA World Service Survey</u>		
<u>1. Gender</u>	<u>1977</u>	<u>1980</u>	<u>1983</u>
A. Female	29	31	30
B. Male	71	69	70
$\Sigma$	<u>100</u>	<u>100</u>	<u>100</u>
<u>2. Age</u>			
A. Under 30	11	15	20
B. Over 30	89	85	80
$\Sigma$	<u>100</u>	<u>100</u>	<u>100</u>

chemical dependency treatment. Subjects who were employed full-time or part-time, or who were unemployed<sup>11</sup> at the point of intake are considered employable. Clients who reported themselves to be homemakers, students, disabled, or retired were considered to be unemployable.<sup>12</sup> In general terms the unemployable category would be much less likely to report full-time or

<sup>10</sup> Adapted from AA World Services (1984). "The General Service Office of AA has surveyed their membership on a triennial basis since 1968" (AA World Services, 1984, p. 1).

<sup>11</sup> Unemployed subjects were considered to be eligible for employment and therefore employable.

<sup>12</sup> The shortcomings of this variable are quite evident. In defense of the classification scheme, it does follow federal guidelines regarding who is considered to be employable. On the other hand, students and retired persons move in and out of the employment market fairly fluidly. Homemakers are increasingly a part of the employment market, and from a sense of fair play, if from no other criteria, deserve to be classified other than unemployable. When CATOR-III clients answered the question they were asked to provide the best choice which represents their situation. Consequently it was assumed that someone who reported their status as homemaker would be more likely to remain in that category than move to one of the employable categories. Clearly this is a topic for further study. Employment data is one of several possible Ph.D. dissertations which could be generated through further analysis of the CATOR-III data pool.

part-time employment or to enter the employment market. Including them in outcome measures of employment would result in unrealistically reduced levels of functioning for the group.

"Type of substance" is a variable which is sensitive to the increasing awareness that many people have problems with more than one chemical.<sup>13</sup> The literature suggested that persons with multiple chemical problems have a poorer prognosis than persons who only have problems with alcohol. If the multiple addictive problems are not identified during treatment, clients might only be substituting chemicals and thus erroneously considered to be treatment successes. It might also be hypothesized that clients with multiple chemical problems might require longer periods of follow-up services focusing on specific issues of multiple drug abuse (Bowen, 1987, p. 123).

The remaining control variables are fairly self evident. "Marital status" and "years of education" were included in response to research which has shown that alcoholic clients who have natural support systems available to them appear to have a better prognosis. Marital status was indicative of the presence or absence of family support. More or less education, as a rough measure of socioeconomic status, has been correlated with successful functioning, access to supportive services, better health care, etc (Polich et al., 1981, p. 272).<sup>14</sup> "Ethnicity" was included due to the

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<sup>13</sup> For detailed discussion of drug abuse among populations considered "alcoholic" see Hesselbrock et al (1985) or Schuckit (1985B).

<sup>14</sup> As noted previously by Gibbs and Flanagan (1977), there were no variables which provided a consistent picture regarding their influence on outcome functioning. Level of education has been demonstrated to correlate with outcome functioning in a number of studies, but also not to correlate with outcome functioning in other studies. This lack of consistency may well be the effect of the type of setting in which the study is being conducted. For example, in a sample drawn from a state hospital population where the level of education is uniformly relatively low, one might not find a positive correlation with outcome. In a different setting, such as a for-profit

considerable variation in use of treatment services by different ethnic groups reported in the literature (Westermeyer, 1982; Lex, 1985). As the last control variable, "previous chemical dependency" treatment has been reported to correlate with a poorer outcome prognosis (Polich et al., 1981, p. 131; and Ornstein and Cherepon, 1985).

Outcome functioning can be discussed in terms of a number of dimensions. For this study 11 variables were chosen from five general areas of employment, health, mental health, legal, and sobriety. As in the case of the control variables, the decision to include the variables was based on their importance in the review of literature, availability of information from CATOR, and their interest to the author. For the most part the outcome variables are fairly self-evident and are intuitive measures of successful functioning. Intuitively it makes sense that, if the predictor and intervening variables have been effectively identified, they should correlate with employment, health care, legal status, etc.<sup>15</sup>

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treatment program where there is a broader range of educative experiences, the correlation with outcome might well be more significant.

<sup>15</sup> If the identified variables are, in fact, effective predictors of outcome, then it makes some sense that they should be correlated with outcome measures which have been shown to be reflective of successful adaptation to chemical dependency problems. If the correlations cannot be substantiated between the predictor variables and outcome variables, then it must be concluded that either, the expected test variables were not effective predictors of outcome, or the model which hypothesized the relationships was not very effective.

### SPECIFIC RESEARCH QUESTIONS AND NULL HYPOTHESES

As noted earlier, Figure 1 proposed a model which hypothesized relationships among the variables which were examined in this study. The purpose of explicating the model was to provide structure for the data analyses and guidance regarding the choice of research questions. The model represented a synthesis of ideas abstracted from the literature review in the second chapter. The control variables were expected to have a direct influence on who attends either AA or aftercare. Additionally, the control variables were also expected to have direct influence on the outcome variables.

From an examination of the model it can be seen that the central focus of this study was on the relationships between AA attendance, aftercare and the outcome variables, taking into consideration the control variables. Using a number of data analytic tools, the analyses of the CATOR-III data were accomplished by addressing the following eight research questions:

Question 1: Was there a significant relationship between AA attendance and the control variables?

Null Hypotheses: For each time period, there was no relationship between attending AA and each of the eight control variables.<sup>16</sup>

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<sup>16</sup> The null hypotheses are stated in general terms rather than listing each specific null hypothesis in order to avoid laborious repetition and conserve space. For example, for the first research question there were the 32 specific hypotheses (8 control variables X 4 time periods).

Question 2: Was there a significant relationship between aftercare attendance and the control variables?

Null Hypotheses: For each time period, there was no relationship between attending aftercare and each of the eight control variables.

Question 3: Were there significant relationships between the control variables and those outcome variables for which significant relationships with the test variables had previously been demonstrated?

Null Hypotheses: For each time period, there were no relationships between the outcome variables (for which statistically significant relationships with the test variables had previously been demonstrated) and each of the eight control variables.

Question 4: Was there a relationship between AA attendance and the outcome variables?

Null Hypotheses: For each time period, there was no relationship between attending AA and each of the eleven outcome variables.

Question 5: Was there a relationship between aftercare attendance and the outcome variables?

Null Hypotheses: For each time period, there was no relationship between attending aftercare and each of the eleven outcome variables.

Question 6: Does cross-lagged panel analysis enhance our understanding of the correlations between the test variables and the specific outcome variables for which relationships with the test variables could be demonstrated?

Null Hypotheses: For each comparison of time periods (6-months with 12 months, etc), there were no differences between the two cross-lagged correlations, connecting the test variables with their respective outcome variables.

Null Hypotheses: For each comparison of time periods (6-months with 12 months, etc), the synchronous correlation between the test variables and outcome variables was spurious, due to the independent influence of a third (unknown) variable.

Question 7: Do the test variables improve our understanding of the variance in the outcome variables, over and above the variance already explained by the control variables?

Null Hypotheses: For each time period, AA attendance did not add to the understanding of the variance in the outcome variables when the control variables were entered first into a multiple regression equation.

Null Hypotheses: For each time period, aftercare attendance did not add to the understanding of the variance in the outcome variables when the control variables and AA attendance were entered first into a multiple regression equation.

Question 8: How effective was a model (Figure 1) which explained the variance in the outcome variables through a combination of test and control variables?

Each of the research questions (and null hypotheses) were answered through analysis of the CATOR-III data within each of the six-month follow-up intervals. Trends which were evident in the data across the time intervals were addressed descriptively. The next chapter will discuss the specific methodological approaches to the analysis of the data which were undertaken in this study.

## CHAPTER FOUR: METHODOLOGY

### OVERVIEW

This chapter is divided into three sections. The first section describes the development and operation of the Chemical Abuse/Addiction Treatment Outcome Registry of St. Paul Minnesota, which provided the data for this secondary data analysis. Following a description of the procedure for sample selection, the study sample is compared with the population from which it was drawn. Data collection procedures are reviewed and the creation of the data tape and system file for this study are briefly discussed.

The second section of this chapter presents an overview of the design of the secondary data analysis. A six-step process is explicated in which the data analysis moves from consideration of univariate variables, through bivariate comparisons, to the multivariate data analyses. A rationale is presented for the use of tests of statistical significance and measures of association with a purposive sample.

The chapter concludes with a discussion of a construct validity problem encountered with one of the test variables. In the early stages of the data analysis it became evident that there were problems with aftercare as a construct. After a short discussion of the inherent limitations of a secondary data analysis, a description of the efforts taken to improve the construct is presented.



### DESCRIPTION OF THE CATOR SAMPLE

The Chemical Abuse/Addiction Treatment Outcome Registry contracts with chemical dependency treatment programs to collect and analyze follow-up data and provide reports about discharged clients for two years following the clients' discharge from their respective treatment programs.<sup>1</sup> Founded in 1979, CATOR began as a collaborative project involving seven Minneapolis-St. Paul area treatment centers operating under the aegis of the St. Paul-Ramsey Medical Education and Research Foundation. Their original mandate was to "develop and implement a project that would assess the effectiveness of treatment for chemical dependency" (Hoffmann and Belille, 1982, p. 3).

CATOR has evolved over the years in terms of both size and methodological sophistication. Recognizing that program evaluation cannot be "all things for all people," an early decision was made to limit the scope of the topics which would be addressed to those for which specific, objective, and measurable operational definitions could be developed. "Quality of life" and other intangible issues were felt to be "beyond the practical scope of their initial effort" (Hoffmann and Belille, 1982, p. 6).<sup>2</sup>

CATOR's view of their role has changed from that of providing consultation to treatment centers interested in conducting their own

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<sup>1</sup> CATOR, Norman G. Hoffmann, Ph.D., Executive Director, (612) 221-2740, 17 West Exchange Street, Suite 420, St. Paul, MN 55102.

<sup>2</sup> CATOR discusses the concept of "planned inadequacy", by which they mean that their initial product (in 1980) will be less than optimal but sufficient to meet basic needs" (Hoffmann and Belille, 1982, p. 6).

internal follow-up evaluation, to acting as a centralized patient registry. Standardized data collection instruments are utilized and increasingly sophisticated analytical summary reports are provided to their clients.<sup>3</sup> CATOR's growth can be seen in the changes in size of the data pool from CATOR-I to CATOR-IV. As a patient registry in 1980, CATOR-I involved 3,757 subjects from 7 treatment facilities in Minnesota. By 1983 CATOR-III had enrolled 13,000+ subjects from 33 treatment centers in 12 states (Hoffmann, Belille, and McKenna, 1985, p. 11). Currently CATOR-IV has enrolled more than 20,000 subjects and now includes an adolescent treatment registry.

The data for this study were collected over two and one half years from January, 1983 through July, 1985. The CATOR-III population at the time the system file for this study was created consisted of 13,153 subjects who had completed two years' of follow-up.<sup>4,5</sup> From the available population of inpatients, a sample of 2,950 inpatients was selected for whom as complete data as possible were available.<sup>6</sup> With the exception of the multiple regression analyses and the discriminant analyses, this sample of 2,950 provided the basis for the majority of the data analyses reported in the ensuing chapters of this study. Using a random selection process, the study sample was in turn subdivided into two samples of 1,435 subjects and

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<sup>3</sup> CATOR presently defines itself as a "fee-for-service objective clinical auditor" (Harrison and Hoffmann, 1987, p. 10).

<sup>4</sup> The system file for this study was created in September, 1987.

<sup>5</sup> The CATOR data pool consisted of 13,153 subjects. 9,222 subjects were treated on an inpatient basis. 3,931 subjects were treated on an outpatient basis. To avoid the potentially confounding effects of mixing inpatients and outpatients, this study looked at inpatients only.

<sup>6</sup> For a number of variables there were a small number of missing cases which were handled in the analysis of the data by excluding the individual from the analysis under consideration. Consequently the sample N varied from 2910 to 2950 depending on which variables were being compared.

1,515 subjects which were used, respectively, for the development and cross-validation of the results of the multiple regression analyses.

Table 5: Comparison of the CATOR-III Inpatient Population With the Study Sample Along Selected Demographic Variables<sup>7</sup>

	Percent of CATOR-III Inpatient Population (N = 9,922)	Percent of Study Sample (N = 2,950)
<u>1. Gender</u>		
Male	70	71
Female	30	29
<u>2. Age</u>		
Under 20	5	5
20- 29	29	25
30- 39	27	28
40- 49	16	18
50- 59	12	14
60+	11	10
<u>3. Ethnicity</u>		
White	93	95
Hispanic	1	1
Black	4	3
Other	2	1
<u>4. Education</u>		
< 8 yrs	6	5
9- 11 yrs	21	14
12 yrs	40	38
Over 12 yrs	33	43

<sup>7</sup> Table 5 is adapted, in part, from three tables reported in Hoffmann et al. (1985, pp. 17-20).

5. Marital Status

Single	29	23
Divorced	15	11
Separated	6	5
Widowed	4	3
Cohabit.	3	2
Married	43	56

6. Employment Status

Full-time	52	61
Part-time	6	6
Unemployed	23	14
Retire/		
Disabled	10	9
Homemaker	6	6
Student	3	4

Table 5 shows that in most respects, the study sample was roughly comparable with the CATOR-III inpatient population in terms of demographic similarity. There were no real differences in terms of gender and ethnicity. Overall, the study sample tended to be a little older and slightly better educated than the CATOR-III inpatient population from which it was drawn. In comparison with the CATOR-III inpatient population as a whole, more sample subjects were married or employed on a full-time basis and fewer sample subjects were divorced or unemployed.

These findings were certainly consistent with the earlier stated expectation that the requirements for inclusion in the sample (i.e., complete data) would result in the generation of a study sample which might differ from the general population from which it was drawn. As noted in the literature review, the variables which differentiated the study sample from the CATOR-III inpatient population (educational level, employment status,

over age 30, and marital status) have been shown to correlate with more successful outcome functioning.<sup>8,9</sup>

Each treatment program affiliated with CATOR provided a staff person identified as the CATOR liaison who compiled the intake, history, and discharge summary data and who, each month, forwarded the new cases to CATOR's central office for further verification and data entry. New cases entered the system each month and were followed for two years. In this sense the CATOR-III inpatient population can be considered to be dynamic rather than static in that each month new cases entered the system and completed cases exited the system.<sup>10</sup>

All of the follow-up data were collected at a centralized location by CATOR, using trained telephone interviewers, who utilized a standardized 66 item interview protocol. If the clients were unavailable, the written consent obtained during the clients' inpatient treatment allowed CATOR to obtain the requisite follow-up information from a significant other chosen by the client. Approximately 20% of the data were obtained through interviews of significant others. A small number of clients, who were not able to be reached by telephone, were contacted by mail (Hoffmann et al., 1985, p. 14).<sup>11</sup>

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<sup>8</sup> Although beyond the scope of this study, one might expect that the sampling process used in this study would yield a higher functioning sample when compared with the CATOR-III inpatient population on a variety of outcome measures.

<sup>9</sup> As argued by Polich et al. (1981) successful outcome functioning may also be a function of follow-up as "successes" were more easily traceable at follow-up as a concomitant of their improvement (p. 33).

<sup>10</sup> The Executive Director, Research Coordinator and Data Base Manager shared oversight responsibilities for maintaining the quality of the data pool.

<sup>11</sup> It is unclear what the effect was, if any, of obtaining data from a variety of sources. Certainly multiple sources of data enhanced the overall return rate. Collateral interviews have been previously discussed. Sobell and Sobell (1981) compared "client-interviews" with "client-completed questionnaires" and found no significant differences in the reliability of data. An

The resulting data were coded at CATOR and stored as computer files.<sup>12</sup> The data tape for this study was created by downloading all of the CATOR-III inpatients who had completed two years' follow-up and selecting for inclusion in the study sample only those subjects who had been successfully contacted and interviewed at all four follow-up interviews.<sup>13</sup> At the same time the data tape was created, a system file was also generated to allow for more expeditious use of computer resources by including only those variables which would be used in this study. See Appendix A for a list of CATOR protocol items used in this study.

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interesting topic for further study would be to explore the effect of the multiple data sources on the validity and reliability of the CATOR data.

<sup>12</sup> See the earlier discussion in the second chapter regarding the reliability of the data and CATOR's procedural checks to insure that the data were properly coded and transferred to the computer files.

<sup>13</sup> For the purpose of data analysis, subjects were aggregated at the point of follow-up. As an example, all subjects' six-month responses were aggregated, regardless of when the six-month interview took place between 1983 and 1985.

## OVERVIEW OF THE DATA ANALYSIS

The design of the secondary analysis of the CATOR data involved a six-step process, moving from univariate analysis through bivariate analysis to multivariate analysis.<sup>14,15</sup> Step one of the design looked at the frequency distributions of the variables to check on the reliability of the data and to comment on patterns in the manner in which the data were distributed along the variables. In step two, the bivariate relationships among the test-outcome, test-control variables, and selected outcome-control variables were analyzed.<sup>16</sup> Building on the results of step two, step three used cross-lagged panel analysis to further assess the bivariate relationship between the test variables (AA attendance and aftercare attendance) and sobriety, the one outcome variable which was found to be significantly correlated with the test variables.

Using multiple regression analysis, step four addressed the relative contribution of the control variables and the test variables to sobriety as an outcome variable. The integral issue addressed by this step was whether AA attendance and aftercare added to our understanding of the variance in the outcome variable, after all of the effects of the control variables had been taken into account. Step five cross-validated the multiple regression

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<sup>14</sup> The data analysis was made possible by a \$2,450 grant for computer time from The Academic Computing Services and Systems of the University of Minnesota

<sup>15</sup> The statistical analysis was accomplished through use of a variety of subprograms of the Statistical Package for the Social Sciences (SPSS).

<sup>16</sup> The focus of this study is on the relationships between the two test variables and the outcome measures. Relationships between the control variables and outcome variables which did not show a significant relationship with the test variables were felt to be beyond the scope of this study.

findings developed in step four. Finally, in step six, discriminant analysis was used to assess the relative efficacy of the model used to explain sobriety outcomes in terms of the selected control and test variables. This approach to a secondary data analysis of the CATOR-III data yielded additional insight into the relationships among the study variables and, more importantly, pointed out design limitations and limitations regarding our current level of understanding of posttreatment adjustment issues in the chemical dependency field.<sup>17</sup>

As the first step, frequency distributions were calculated for relevant test and control variables to check for blatant coding or data entry errors.<sup>18</sup> The frequency distributions also allowed for comments regarding the shape of the distribution, whether the data were distributed normally across the variable, or biased in the direction of specific values of the variable. In a similar fashion the crosstabulation tables were also used as a further check for data entry errors (Norusis, 1983, p. 50).

The second step in the data analysis involved a series of bivariate analyses among the test and outcome variables, and selected comparisons with the control variables (See Tables 6,7, and 8). Crosstabulation tables were set up to explicate the bivariate relationships in terms of how subjects were jointly distributed among the various bivariate combinations (Nie et al., 1975). The chi-square test ( $X^2$ ) was chosen to assess whether

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<sup>17</sup> As will be discussed in more detail, the "bottom line" was the recognition that the majority of variance in the outcome variable (singular) remained to be explained. A significant relationship between the test variables and a multivariate, multidimensional perspective of outcome measures was not supported by the findings of this study.

<sup>18</sup> However, it should be pointed out that one of the potential difficulties involved in a secondary data analysis is the difficulty in differentiating interviewing, coding, or data entry errors. (Kiecolt and Nathan, 1985).



Table 6: List of the Bivariate Analyses of The Relationships Between  
the Control Variables and Test Variables

Control Variables

1. age
2. sex
3. marital status
4. ethnicity
5. employability
6. previous CD Tx
7. type of substance
8. education

Test Variables<sup>19</sup>

1. AA Attendance
2. Aftercare

Table 7: List of the Bivariate Analyses of The Relationships Between  
the Control Variables and Outcome Variables<sup>20</sup>

Control Variables

1. age
2. sex
3. marital status
4. ethnicity
5. employability
6. previous CD Tx
7. type of substance
8. education

Outcome Variable

1. sobriety

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<sup>19</sup> The Test variables were treated separately in the bivariate analyses.

<sup>20</sup> Only those outcome variables which had previously demonstrated a statistically significant relationship with the test variables were looked at in terms of the control variables.

Table 8: List of the Bivariate Analyses of The Relationships Between  
the Test Variables and Outcome Variables

<u>Test Variables</u>	<u>Outcome Variables</u>
1. AA attendance	1. sobriety
2. Aftercare	2. full-time employment
	3. part-time employment
	4. welfare assistance
	5. disability assistance
	6. injuries
	7. medical hospitalization
	8. emotional hospitalization
	9. ER visits
	10. misdemeanors
	11. felonies

the two variables "operated independently from one another" or, whether the  $\chi^2$  test was indicative of a statistically significant relationship between the variables (Howell, 1982, p. 97).<sup>21,22</sup> As the chi-square test is particularly sensitive to large sample size, depending on the number of categories, either phi ( $\phi$ ) or Cramer's V were also reported as a measure of the strength of the relationship between the two variables.<sup>23,24</sup> In

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<sup>21</sup> "Small values of chi-square indicated the absence of a relationship. A large chi-square implied that a systematic relationship of some sort existed between the variables" (Nie, Hull, Jenkins, Steinbrenner, and Brent, 1975, p. 224).

<sup>22</sup> The chi-square test required that two assumptions be met. The first was that the "each individual observed contributed a single entry to the joint frequency table. The second assumption was that, for tables with more than a single degree of freedom, a minimum cell frequency of five was necessary to be regarded as adequate" (Hays, 1981, p. 305).

<sup>23</sup> Very large samples can generate many statistically significant  $\chi^2$  results which are meaningless in terms of the magnitude of association, which may be very small even though unquestionably "statistically significant." (Hays, 1981; and Howell, 1982).

<sup>24</sup> Cramer's V can range between 0 and +1. "A large value would signify that a high degree of association exists without revealing the manner in which the variables were associated" (Nie et al., 1975, p. 224).

situations where variables involved interval data, the data were grouped into logical categories and treated as categorical data.<sup>25</sup>

For the bivariate analyses, subjects were classified into groups on the basis of their reported responses on the specific independent variables being considered. The *ex post facto* creation of comparison groups (e.g., AA attenders versus AA non-attenders) for the purpose of data analysis clearly did not involve either random sampling or random assignment. Blalock (1972), Glisson (1985), and Rubin and Conway (1985), have argued the legitimacy of using tests of statistical significance to assess relationships with both purposive samples and also with population data. Following their logic, the relationships between the independent and dependent variables were assessed by tests of statistical significance.

Rather than using the tests of statistical significance to comment on the probability that specific relationships might occur in reality, when used with a purposive sample such as used in this study, tests of statistical significance provide a means of assessing whether the observed results within the study sample could be attributed to random association.<sup>26</sup> Only those  $\chi^2$  tests which produced a critical value at  $\alpha \leq 0.01$  were considered to be significant.<sup>27</sup>

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<sup>25</sup> While interval variables were collapsed into logical categories for the bivariate analyses, the interval variables retained their "interval" quality during the multiple regression analyses.

<sup>26</sup> That is to say that the observed relationship between the independent variable and the dependent variable could be explained by a model which dictated that any association between the two variables was the result of random error or random fluctuation rather than an actual relationship. The significance test provided an estimate of the probability of this random fluctuation in the observed effect. (Glisson, 1985, pp. 377- 386).

<sup>27</sup> See more detailed discussion later in this chapter regarding the use of conservative critical values for the purpose of controlling for the possibility of spurious relationships resulting from a large sample size.

Obviously, if the observed results could be attributed, at least hypothetically, to haphazard, nonsystematic variation in the relationship between the variables, it would be expedient to use caution in the interpretation of the results. In a similar manner, within the sample, tests of the magnitude of association were presented to assess the percentage of variance in the outcome variables explained by the independent variables.<sup>28</sup> Tests of the magnitude of association (and measures of association) were used to assess the relative importance of statistically significant relationships.

Table 7 lists the comparisons between the control variables and the one outcome variable for which a statistically significant relationship with the two test variables across the four follow-up time periods of this study were demonstrated. The control variables were of interest only within the context of a previously demonstrated significant relationship between a test variable and an outcome variable. While the correlations between the remaining outcome variables, which did not demonstrate a statistically significant relationship with the test variables, and the control variables is certainly a topic of interest, it was considered, for practical and financial considerations, to be beyond the immediate scope of this study.

In the third step of this design, cross-lagged panel analysis was used to take advantage of the element of time and discuss the relationships among the zero order bivariate correlations between the test variables and

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<sup>28</sup> See footnote (24) in the next chapter which discusses a decision use contingency tables (with  $\chi^2$  and  $\phi$  or Cramer's V) rather than ANOVAs (with F-tests and  $R^2$ ).

sobriety, observed over time.<sup>29,30</sup> The basic assumption underlying cross-lagged panel analysis is that the repeated measurement of the same two variables over time potentially should provide information about the direction of any causal asymmetries between the two variables (Cook and Campbell, 1979, p. 309). Two issues (See Figure 2) are addressed by cross-lagged panel analysis. The first is "whether 'A' is a stronger cause of 'B' than 'B' is of 'A'" (p. 309).<sup>31</sup> The second is whether "C" is creating a spurious relationship between "A" and "B."

Figure 2 diagrams possible causal relationships between two variables for which a statistically significant synchronous correlation has been identified. Covariation is a necessary but not sufficient condition to attribute causation. Assuming that a relatively stable relationship can be demonstrated across a time interval, cross-lagged panel analysis allows for comments regarding possible directionality of the relationship as well as whether an extraneous variable is influencing variables "A" and "B" giving the appearance of a relationship, which is, in fact, spurious.

Kenny (1975) felt that cross-lagged panel analysis provided a means to extend the discussion of a correlational relationship between two variables by ruling out plausible alternative explanations of a causal effect

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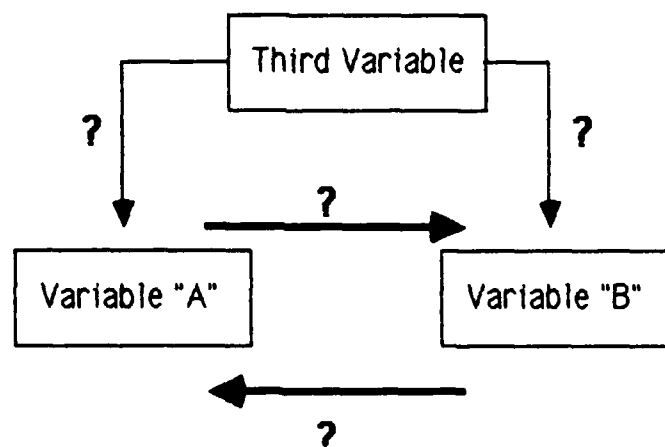
29 Sobriety was the only outcome variable to consistently demonstrate, over time, a statistically significant relationship with the test variables.

30 A panel study uses data collected from the same group of subjects at two or more points in time (Markus, 1979, p. 7). Cross-lag is a statistical technique using simple correlations to comment on the relationship between two variables by observing how the correlation coefficients change when one variable is lagged behind the other.

31 It should be emphasized that correlation is concerned with the covariation of variables and not causal relationships. Both cross-lagged panel analysis and path analysis are correlative techniques which attempt to further hypothesize about relationships among variables in terms of possible direction of relationships.

due to spuriousness.<sup>32</sup> "An equality in the cross-lagged correlations would suggest the relationship between "A" and "B" was due to an unmeasured third variable" (p. 889).

Figure 2: Diagram of the Question Regarding Causality in a Correlative Relationship Between Two Variables Addressed by Cross-Lagged Panel Analysis



Both Vannicelli (1978) and Costello (1980) have used cross-lagged panel analysis in the more specific sense, described by Rozelle and Campbell (1969), to conclude that the temporal asymmetry observed in the cross-

<sup>32</sup> Kenny noted that the chief alternative explanation of any causal effect is spuriousness. "Almost any statistical relationship can be attributed not to causality but to spuriousness" (p. 888).

lagged correlations suggested a causal relationship between the test and outcome variable.<sup>33</sup>

True experiments control for spurious relationships through random assignment of subjects to treatment and control groups (Kenny, 1975). Vannicelli (1978) and Costello (1980), using passive observational designs based on procedures explicated by Kenny (1975) and Cook and Campbell (1979), have used cross-lagged panel analysis or path analysis<sup>34,35</sup> to suggest a method for at least partially controlling for the spurious effects of an unknown or unmeasured third variable and commenting on the directionality of relationships (Costello, 1980; Vannicelli, 1978). In cross-lagged panel analysis (see Figure 3), the assumption is that if the test variable truly influences the outcome variable, the cross-lagged correlation coefficient ( $r_{t1o2}$ ) lagging the test variable at "time-1" behind the outcome variable at "time-2" should be greater than the cross-lagged correlation coefficient ( $r_{o1t2}$ ) lagging the outcome variable at "time-1"

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<sup>33</sup> Through analysis of the cross-lagged correlations, Cook and Campbell (1979) suggested that it might be possible to "infer causal processes based on observations of concomitances and sequences as they occur in natural settings without the advantage of deliberate manipulation and controls of an experimental design to rule out extraneous causal influences" (p. 295).

<sup>34</sup> Path analysis is a "causal" model for understanding relationships between correlated variables (Babbie, 1986, p. 433). Recently Costello (1980) contrasted the efficacy of cross-lagged panel analysis and path analysis for commenting on the relationship between aftercare and outcome. Other than to mention that it exists as an alternative for data analysis, path analysis will not be discussed in this study.

<sup>35</sup> Costello argued persuasively for the superiority of path analysis in explicating directionality among variables when compared to cross-lagged panel analysis. The author chose the cross-lagged panel analysis as being more appropriate for an exploration of relationships among variables. A basic assumption for path analysis is that the researcher must have an explicit model accounting for all relationships among all relevant variables. Given that we do not have a clear understanding regarding all of the posttreatment variables contributing to outcome, it is quite likely one would make serious specification errors which would, in turn, invalidate the results of path analysis. (Cook and Campbell, 1979; Pedhazur, 1982; and Rossi, Wright, and Anderson, 1983).

behind the test variable at "time-2."<sup>36</sup> If the test variable influences outcome, the cross-lagged correlation (E) should be larger than the cross-lagged correlation (F). In contrast, if outcome influences the test variable, the cross-lagged correlation (F) should be larger than the cross-lagged correlation (E). If the two cross-lagged correlations are equal, the researcher must conclude that there is no relationship between the variables and that the apparent synchronous correlation is due to the spurious effect of an unknown third variable.

Kenny (1975) urges caution in the use of this procedure.<sup>37,38</sup> He sees cross-lagged panel analysis as "an exploratory strategy of data analysis, for use in uncovering simple causal relationships between uncontrolled variables" (p. 901). Following successful replication of the above, Kenny would recommend that further confirmation be through a formal experimental design. The significance test (z test) for a cross-lagged panel correlation was developed by Peters and VanVoorhis in 1940 and cited in detail in Kenny.<sup>39</sup> Only those z tests which produced a critical value at  $\alpha \leq 0.01$  were considered to be significant.

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<sup>36</sup>  $r_{t1t2}$  refers to the zero-order correlation between the test variable at time<sub>1</sub> and the outcome variable at time<sub>2</sub>.  $r_{o1t2}$  refers to the zero-order correlation between the test variable at time<sub>2</sub> and the outcome variable at time<sub>1</sub>. In  $r_{t1t2}$  the test variable is lagged behind the outcome variable. In  $r_{o1t2}$  the outcome variable is lagged behind the test variable.

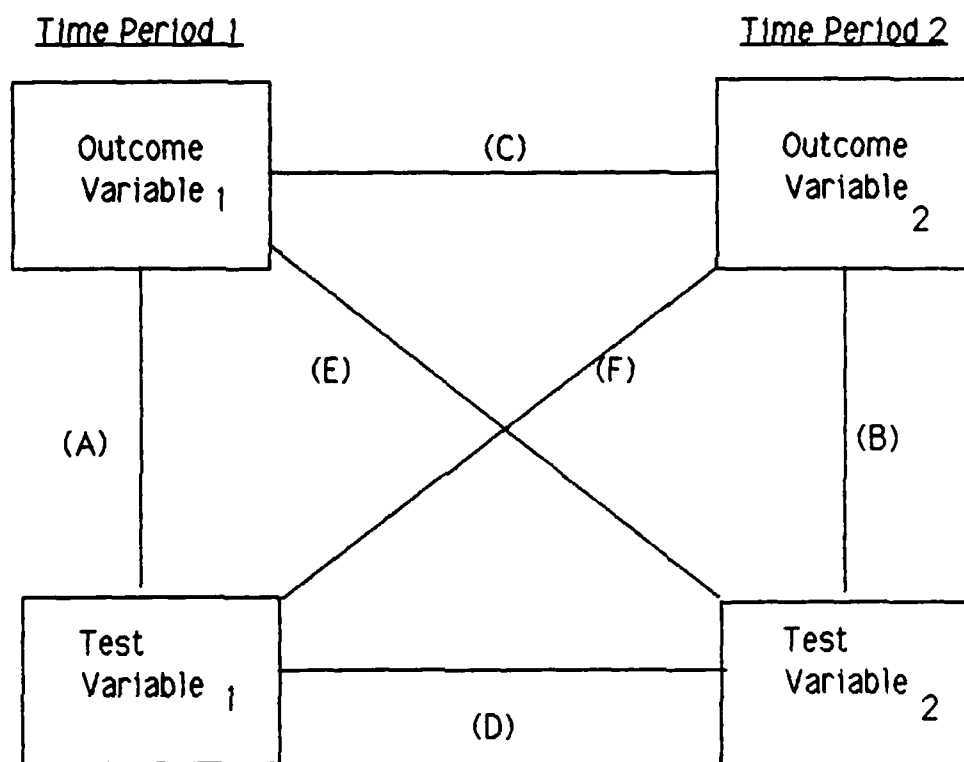
<sup>37</sup> Both the synchronous correlations and the autocorrelations must demonstrate stability over time, allowing for some temporal erosion in the size of the correlations, to permit comments about the cross-lagged correlations (Cook and Campbell, 1979, p. 311).

<sup>38</sup> A limitation of cross-lagged panel analysis is that it looks at the relationship between a predictor and outcome variable in "either-or" terms. The assumption of absolute independence between the two variables is rarely met in social variables where there often is a significant amount of interdependence and reciprocal influence.

<sup>39</sup> The z test is also reproduced here in detail due to the difficulties the author experienced in tracking down the original citation. 
$$z = \frac{\sqrt{N} (r_E - r_F)}{R (1 - r_E^2)^2 + (1 - r_F^2)^2 - k}$$
 where N is the sample size and k is a constant:



Figure 3: Diagram of Cross-Lagged Panel Analysis  
For Two Variables at Two Time Periods



(A) & (B) = synchronous correlations  
 (C) & (D) = autocorrelations  
 (E) & (F) = cross-lagged correlations

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$$k = (r_C - r_B r_E) (r_D - r_B r_F) + (r_A - r_C r_F) (r_B - r_C r_E) + (r - r_A r_F) (r_D - r_A r_E) + (r_A - r_E r_D) (r_B - r_D r_F)$$

So far the discussion of data analysis has been limited to the consideration of bivariate relationships. In step four of the design, the perspective was enlarged to include multivariate relationships between sobriety, as an outcome variable, and the test and control variables.<sup>40</sup> Multiple regression was used to address the question of the relative contribution of the test variables vis-a-vis the control variables.

The independent variables consisted of either continuous data or categorical data which had previously been collapsed into dichotomies to conform to the multiple regression requirement for interval data.<sup>41</sup> The dependent variable was measured on an interval scale (number of months of sobriety per follow-up period). Multiple regression equations were developed within each time period. Six-month outcome variables were compared with six-month control and six-month test variables, etc. Trends evident in the data over the two-year time frame of this study were discussed descriptively.

As described in an earlier chapter, the control variables chosen for this study reflect variables which have been previously shown to explain a portion of the variance in the outcome variables. The first step (see Figure 4) in the multiple regression analysis was to assess the relative contribution of all of the independent variables to an explanation of the variance in sobriety by entering them into a multiple regression equation in

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<sup>40</sup> As will be discussed in the next chapter, bivariate analyses between the test variables and outcome variables (see Table 8) yielded only two statistically significant relationships which were consistent across the two year time frame of this study: AA attendance and sobriety, and aftercare and sobriety. Consequently sobriety is the only outcome variable addressed through multiple regression and linear discriminant analyses in the remaining sections of this chapter.

<sup>41</sup> As noted earlier, any dichotomy can be treated as though it were an interval measure (Nie et al., 1975, p. 5).

a stepwise fashion, without identifying whether they were test or control variables. "The order of inclusion was determined by the respective contribution of each variable to explained variance" in the outcome variable (Nie et al., 1975, p. 345).<sup>42</sup> The second step (see Figure 4) of the multiple regression analysis involved a two stage process. First, all of the control variables meeting the minimum levels established by the multiple regression parameters were entered, as a block, into the multiple regression equation. Second, having taken into account the control variables, AA attendance as a test variable was next entered, providing it met the minimum F ratio and tolerance levels established by the parameters of the program. In a similar fashion, in the

third step (see Figure 4), the control variables and AA attendance were first entered as a block. Next, aftercare was added to see if it added anything to the explanation of the outcome variance after accounting for both the control variables and AA attendance.<sup>43</sup> The F ratio test was used to assess whether the addition of the test variables added to the explanation of the variance already accounted for by the control variables. As noted in an earlier discussion, the tests of significance were used for comparisons within the study sample and with no expectation that the results would be generalized beyond the sample.

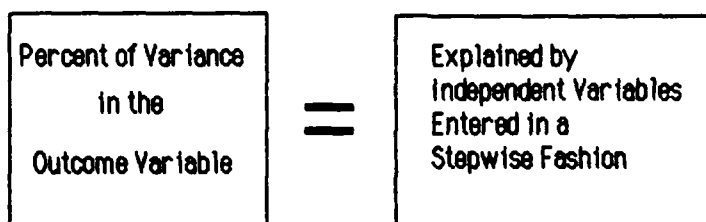
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<sup>42</sup> The multiple regression analyses used SPSS default settings for the parameters of the multiple regression. All independent variables were considered. The minimum F ratio for inclusion was 0.01 and the minimum tolerance (proportion of the variance of a specific variable under consideration not explained by the independent variables already in the equation) was 0.001. (Nie et al., 1975, p. 346).

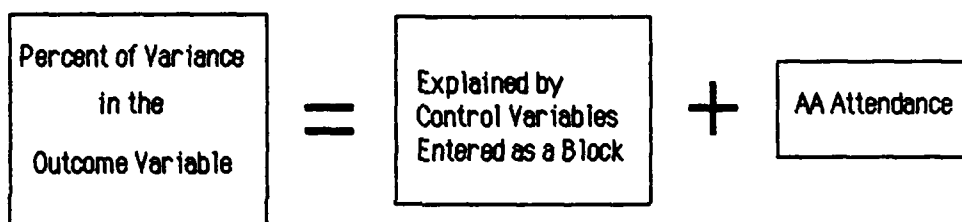
<sup>43</sup> The choice of entering AA attendance first was based on the results of the bivariate analyses. Adding aftercare second, after AA attendance, in effect controlled for the problematic interaction between the two predictor variables. SPSS conducted step two and step three at the same time.

Figure 4: Diagram of Multiple Regression Analysis

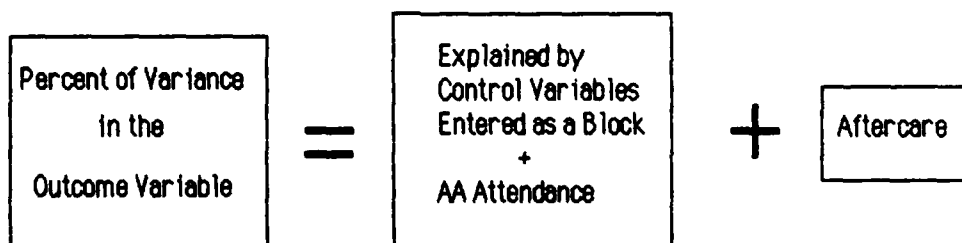
Step One:



Step Two:



Step Three:



One difficulty in an ex post facto analysis of a large body of data is the probability of making a Type I error, i.e., that in a sample the probability of a spurious relationship occurring increases (Bentler, et al., 1976; and Pedhazur, 1982). This issue was addressed by this design on two levels.

First, a conservative critical value was established against which the tests of statistical significance were compared. Only those tests which produced a critical value at  $\alpha \leq 0.01$  were considered to be significant.

Second, the issue of the increased probability of spurious outcome in a large ex post facto study was addressed through a cross-validation of the multiple regression equations. As was previously discussed, the sample ( $N = 2,950$ ) was divided using a random number process into two subsamples of equivalent size.<sup>44</sup> If significant relationships were demonstrated in both samples, one could conclude that the results represented a substantiated rather than spurious relationship.

The multiple regression equations developed on the first subsample were used to predict outcome scores ( $Y'$ ) for the second subsample. A "Pearson  $r$ " was then calculated between the actual outcome scores ( $Y$ ) of the second subsample and their predicted outcome scores ( $Y'$ ). This  $ryy'$  is analogous to a multiple correlation for the second subsample, using the data from the second sample with the multiple regression equation of the first subsample (Pedhazur, 1982, pp. 149- 150).

The multiple regression results were considered to be cross-validated when there was a reasonable agreement between the multiple correlation coefficient ( $R$ ) of the first sample and the Pearson  $r$  ( $ryy'$ ) of the second sample.<sup>45</sup> The multiple regression results are considered to be

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<sup>44</sup> The multiple regression equations were developed on a subsample with an  $N = 1,435$ . The results of the multiple regression equations were subsequently cross validated on the second subsample with an  $N = 1,551$ .

<sup>45</sup> Pedhazur (1982) notes that a certain amount of shrinkage in the multiple regression coefficients is to be expected when one compares the original sample  $R$  with the cross-validated  $ryy'$  (p. 149). Dr. Michael Luxenberg, statistical consultant to CATOR, in a personal conversation noted that occasionally the cross-validated  $ryy'$  will be larger than the original sample  $R$ . The increase is spurious, and as long as the two coefficients are reasonably equivalent, the multiple

spurious when there is little or no agreement between the the multiple correlation coefficients. Reasonable agreement between the multiple regression coefficient ( $R$ ) of the first sample and the cross-validated Pearson  $r$  ( $r_{yy'}$ ) of the second sample would substantiate a model explaining outcome variance through the addition of the test variables, adding to our understanding, over and above the outcome variance already explained by the control variables.

The final step of the design used linear discriminant analysis to look at the relative effectiveness of the model (Figure 1) which explained outcome variance in terms of selected control variables and the two test variables of AA attendance and aftercare attendance. One measure of an effective model explaining the variance in the outcome variable would be its ability to predict individuals' outcome scores on the basis of their independent variable scores.

For the purpose of the linear discriminant analysis, the study sample was divided statistically into two groups on the basis of their outcome scores ("sober" and "not sober").<sup>46</sup> A discriminant function was created by "weighing and linearly combining the independent variables so that the two groups, measured on the outcome variable, were forced to be as statistically distinct as possible" (Nie et al., 1975, p. 435). As discriminating variables, the control variables were entered as a block,

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regression results are considered to be validated. Reasonable agreement is a subjective decision which has been enhanced in this study by calculating a  $t$ -test between the actual and predicted outcome scores, using a conservative critical value  $\leq 0.01$ .

<sup>46</sup> As noted earlier, sobriety was the only outcome variable to correlate significantly across time with the test variables.

followed by the two test variables (AA attendance and then aftercare attendance).

The statistical significance of the discriminant analysis was assessed by observing the resulting eigenvalues associated with the discriminant function and its accompanying canonical correlations.<sup>47,48</sup> As a final step, the 2,950 subjects were reclassified by the discriminant function into either sober or not sober groups. The percent of correct assignments provided an estimate of the model's effectiveness when used to predict group membership. An effective model would correctly assign subjects to the appropriate category solely on the basis of their discriminant function scores.

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47 "The eigenvalue is a special measure computed in the process of deriving the discriminant function. It is a measure of the relative importance of the function" (Nie et al., 1975, p. 442).

48 "The canonical correlation is another measure of the discriminant function's ability to discriminate among groups. The canonical correlation squared is interpreted as the proportion of the variance in the discriminant function explained by the groups" (Nie et al., 1975, p. 442).

### PROBLEM WITH "AFTERCARE" AS A CONSTRUCT

In the early stages of the data analysis, it became evident that "aftercare" as a test variable was compromised in terms of construct validity on at least two levels. On one level, it appeared that formal aftercare for chemical dependency treatment was confounded with mental health treatment. In the manner in which CATOR-III asked the question, it was possible that a client who did not attend aftercare would still answer affirmatively because the question did not differentiate mental health treatment from aftercare treatment.

Confounding mental health treatment with chemical dependency aftercare created a situation which would potentially bias the results from at least two directions. The first biasing factor was that the inflated aftercare response would not accurately reflect the contribution of the variable and, further, aftercare might have received credit more appropriately due mental health intervention. The second biasing factor was that mental health clients with alcohol problems have a poorer prognosis than alcoholic clients without identified mental health problems (Schuckit, 1983). Including these clients in the aftercare attendance group by assuming their mental health treatment was equivalent to aftercare treatment could significantly dilute the reported efficacy of aftercare through the negative impact of their relatively poorer prognoses.

This problem is an example of a problem inherent in secondary data analysis. It was not possible to go back and ask subjects to clarify their earlier responses by differentiating their mental health treatment from



chemical dependency aftercare. Even if it were possible to identify a subset of clients within the study sample who had mental health problems, from the existing data it is not possible to separate the two types of treatment. In CATOR-IV the aftercare questions have been written so as to be able to discriminate between chemical dependency aftercare and mental health treatment.

Unlike the first problem, the second problem with construct validity was able to be addressed to a limited degree through further data analysis. The second problem developed from conceptualizing "aftercare attendance" as either being present or absent. Intuitively, it would seem that structuring the variable as a dichotomy would not capture relevant aspects of the variable. Within the constraints imposed by secondary data analysis, the author attempted to improve the quality of the construct by creating an index of the "intensity of aftercare services." It was hoped that this index would provide a more sensitive measure of aftercare.

A small sample (N = 15) of treatment facilities was selected, based on the facilities' relative contribution to the overall sample size. An interview protocol (See Appendix B) was developed by the author to look at a number of program elements which were felt to be relevant to a discussion of the intensity of aftercare services.<sup>48</sup> Telephone interviews were conducted with the 15 aftercare coordinators selected for participation.

Using a checklist (See Appendix C) developed by the author, the resulting descriptive information was quantified. A three- category (high,

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<sup>48</sup> A list of program elements relevant to aftercare was generated based on discussion between the author, CATOR staff, and a local area aftercare coordinator who was consulted prior to the collection of the additional data.

medium, and low) index was created, using a cutting score which divided the sample into roughly three equivalent groups (See Appendix D). In a separate data analysis, selecting from the study sample only those subjects from the interviewed treatment facilities, a number of the bivariate comparisons were recomputed.<sup>49</sup> Unfortunately, the resulting data analyses, which will be described in the next chapter, did not improve the explanatory power of aftercare as a predictor variable when the intensity of aftercare, as defined above, was taken into consideration.<sup>50</sup>

In summary, this chapter has addressed the methodological aspects of this study. A description of CATOR and its operational procedures was presented. The sampling procedure utilized in this study was described and the study sample was compared with the population from which it was selected. A six-step data analysis design was outlined. The rationale for the use of tests of statistical significance and measures of association with a purposive sample was delineated. Finally, a problem regarding the validity of a construct was introduced and an attempt to improve the quality of the construct by creating an index of intensity of aftercare services was described. In the next chapter, the results of the data analysis will be presented.

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<sup>49</sup> Each of the fifteen treatment centers was classified as providing high intensity, medium intensity, or low intensity aftercare services.

<sup>50</sup> Formal assessment of the validity and reliability of the index was beyond the scope of the present study. Informal consensus among the 15 interviewed aftercare coordinators was that the seven elements of the interview protocol identified areas which they felt to be particularly relevant to the operation of their aftercare programs.

## CHAPTER FIVE: FINDINGS

### OVERVIEW

Chapter five reports the results of the secondary data analysis design described in the last chapter. The complex set of data generated by the research design has been divided into four sections to facilitate its presentation. The first section describes selected demographic characteristics of the study sample. Through a series of bivariate comparisons, the second section of this chapter focuses the data analysis by first, clarifying the marginal contributions of the control variables, and second, reducing the number of outcome variables to be examined in the remainder of this chapter.

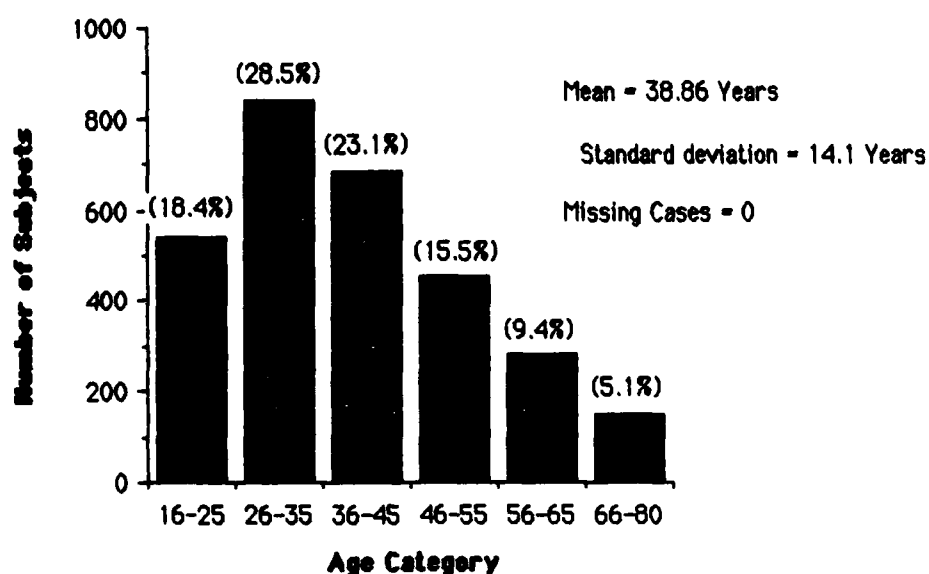
The third section makes use of cross-lagged panel analysis to further explicate the relationships between the two test variables and sobriety, the one dependent variable for which significant relationships across time could be demonstrated. The final section of this chapter begins with a multivariate description of the relationships between sobriety and the control and test variables and, concludes with an assessment of the relative importance these findings vis-a-vis predictive utility.

Each of the sections begins with a brief synopsis of the findings which will then be discussed in some detail. The goal of this chapter is limited to the presentation of the data and a description of the relationships observed among the variables. For the most part, interpretation of the data will be reserved for the next chapter.

### DEMOGRAPHIC CHARACTERISTICS OF THE STUDY SAMPLE

Tables 9 through Table 16 describe characteristics of the sample in terms of the variables selected for study. The adequacy of CATOR's data management procedures were confirmed by this univariate analysis as no obvious problems were noted with the data. A review of the frequency

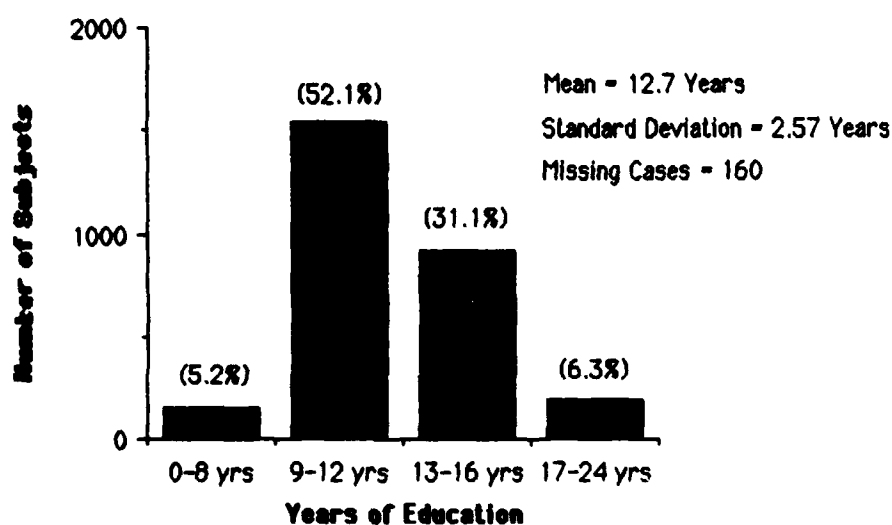
Table 9: Age Distribution of Study Sample



distributions detected neither questionable values nor inappropriate categories. Except as specifically noted in the discussion below, subjects

tended to be distributed in a roughly symmetric, unimodal fashion across the variables. There were no extreme distributions.

Table 10: Years of Education of Study Sample

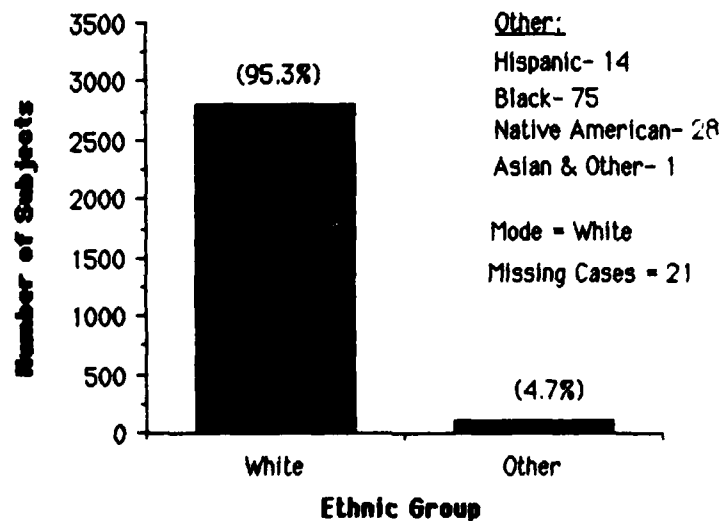


The sample reflected a broad spectrum of subjects, drawn from the Midwestern United States. Male subjects outnumbered female subjects. The sample was skewed somewhat towards younger adults who were predominantly white and frequently involved in a relationship with a significant other. The majority of subjects had at least a high school diploma and were employed at the time of their admission into chemical dependency inpatient treatment. While this admission was the first

admission for most of the subjects, alcohol problems mixed with drug abuse were reported by a substantial proportion of the sample.

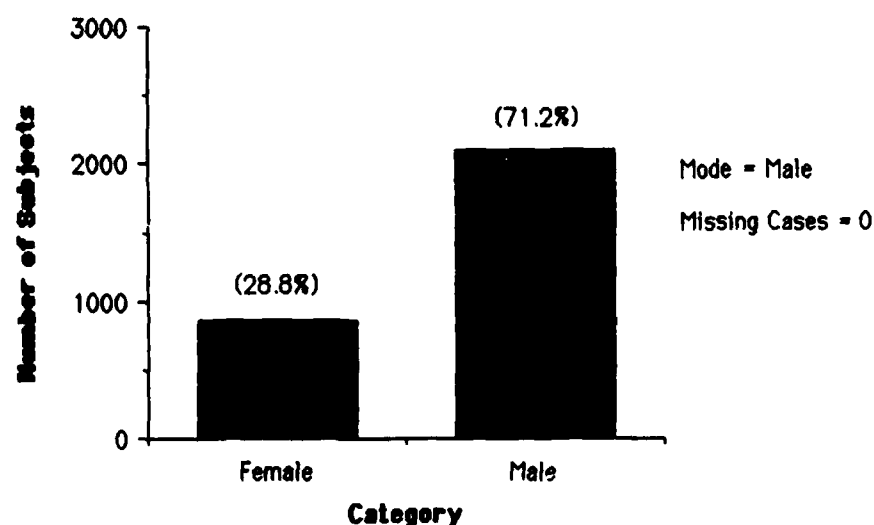
Table 9 shows that the subjects ranged in age from 16 years to 80 years. The mean age was 38.9 years with a standard deviation of 14.06 years. The median age was 37.0 years, indicating that on the age variable the subjects were skewed somewhat to the left, concentrated in the mid-20s to late-30s. This finding is consistent with other studies which report that persons with alcohol problems tend not to be normally distributed, but rather, clustered around the categories of young to middle aged adults (Mendelson and Mello, 1985; Bowen, 1987).

Table 11: Ethnicity of the Study Sample

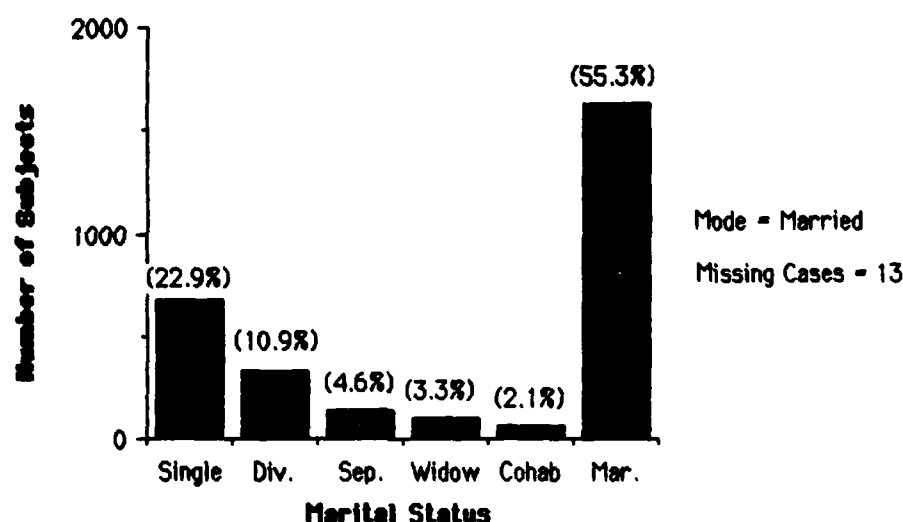


The level of education ranged the entire spectrum from two individuals with no formal education to three individuals with Ph.D level degrees (see Table 10). The mean level of education was 12.7 years with a standard deviation of 2.6 years. This variable appeared to be distributed in a normal fashion around a modal level of 12 years education. 20% of the sample had less than a high school education, while 15% of the sample had at least four years of college education.<sup>1</sup>

Table 12: Gender Distribution of the Study Sample



<sup>1</sup> Answers to questions about education had the most missing answers. 160 individuals did not report their educational level. SPSS protocol deleted these individuals from consideration during the data analysis when education was one of the variables under consideration.

Table 13: Marital Status of the Study Sample

As a group, whites (95.3%) are overrepresented in this study while other ethnic groups (4.7%) are underrepresented (see Table 11). While the treatment centers were located in 12 states, 61% of the subjects reported their state of residence as being Minnesota, Wisconsin, or Iowa. Hoffmann et al. (1985) noted that the proportion of whites in the Minneapolis-St. Paul, Minnesota-Wisconsin, standard metropolitan statistical area was 95% (p. 18). Parenthetically, Westermeyer (1986) noted that ethnicity, as an issue, was most evident in terms of differential access of minority groups to treatment (p. 235).<sup>2</sup>

<sup>2</sup> Amaro, Beckman, and Mays (1987) reported that "the lack of third party coverage for alcoholism treatment together with significantly lower financial resources for Black women severely restricted their treatment options and virtually excluded them from more personalized treatment programs" (p. 227).



Table 14: "Employability" of the Study Sample

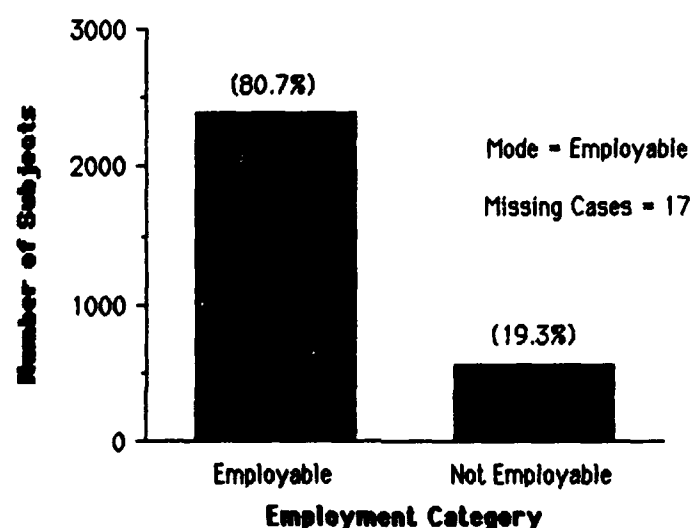
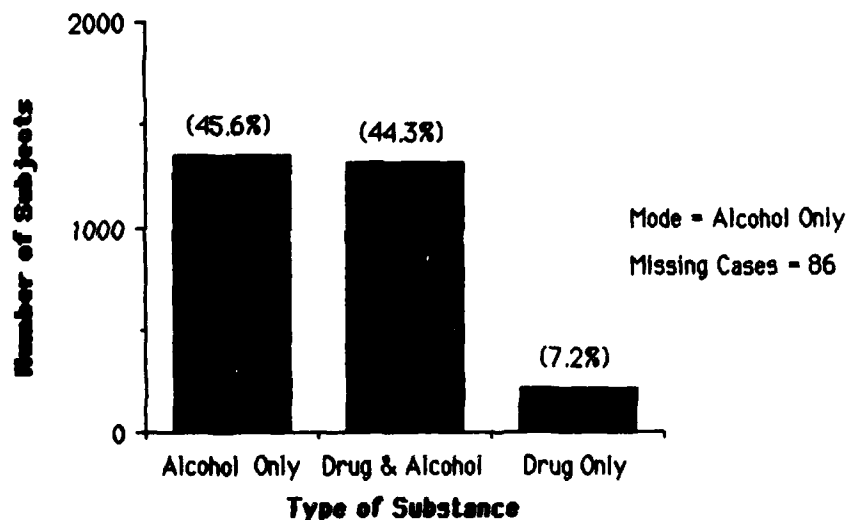


Table 12 shows that 28.8% of the subjects in this study were female, a higher percentage than has been reported in many other studies. Beckman and Amaro (1985) reported that it is estimated that fewer than 20% of all clients in alcoholism treatment are female (p. 15).<sup>3</sup> In this sample males outnumbered females in a ratio of 2.5 to 1. Beckman and Amaro hypothesize that this difference is probably more reflective of a difference in utilization of services rather than being indicative of a substantive difference in prevalence rates of alcohol problems between the sexes.

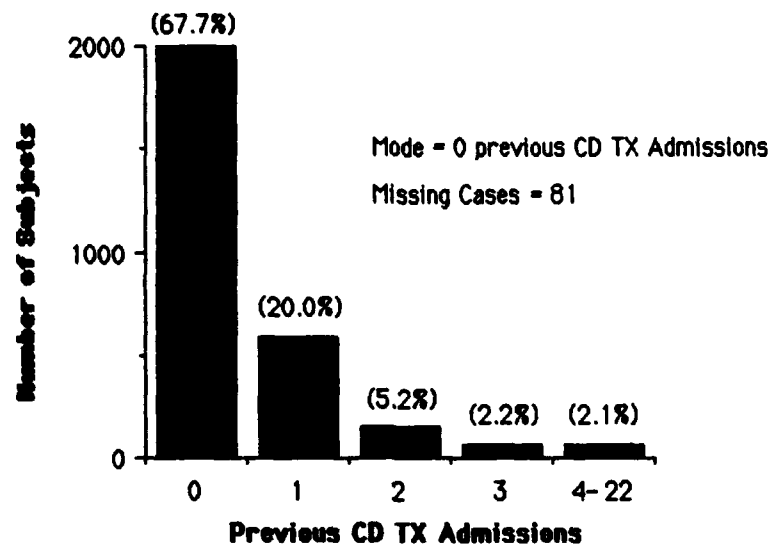
<sup>3</sup> Quoting Vanicelli, Harrison and Belille (1987) noted that "women still accounted for only a very small proportion (8%) of research subjects in treatment outcome studies (p. 574).

57.4% of the sample are either married or living together (see Table 13). As a comparison, only 46% of the larger CATOR-III inpatient population described themselves as married or living together. 22.9% of the sample

Table 15: Multiple Substance Use Reported by the Study Sample



report themselves as single and 15.5% report their status as separated or divorced. Only 3.3% described themselves as widowed, which was consistent with the age distribution being skewed to the left. Access to supportive relationships (including family support) was one of the variables which differentiated successful outcome in a number of the studies reported in the literature review.

Table 16: Number of Prior Admissions for CD Treatment

Employment was another variable reported in the literature which appeared to differentiate successful outcome. In an effort to more accurately describe employment outcomes, "employability", as an independent variable, was created to reflect the quality of being eligible for employment or available for employment. Persons who would not normally be counted in employment statistics have been deleted from the employable category. Table 14 shows that 80.7% of the study sample were considered

to be employable.<sup>4</sup> 19.3% of the sample described themselves as retired, disabled, homemakers, or students, and were considered unemployable.<sup>5</sup>

From Table 15, the relevance of the issue of multiple substance abuse for alcoholic clients is clearly evident. While 45.6% of the sample reported having problems with alcohol only, and specifically denied abuse of other drugs, 44.3% of the sample reported mixing alcohol problems with other substance abuse. 7.2% of the sample reported only drug abuse without alcohol problems. Conceptually dichotomizing chemical dependency into either drug abuse or alcoholism would appear to seriously understate chemical abuse issues reported by a sizeable portion of this sample.

67.7% of the study sample reported no previous treatment for chemical dependency problems (see Table 16). 20.0% of the sample had been hospitalized for previous treatment on no more than two occasions. 5.2% of the sample were hospitalized for three or more admissions. As an extreme outlier, one person in the sample had been hospitalized 22 times for chemical dependency treatment. For the majority of the sample, a "revolving door" pattern of multiple treatment episodes could not be demonstrated.

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<sup>4</sup> 82.7% (1,969) of the 2,380 employable subjects were, in fact, employed. 17.3% (411) of the employable subjects were unemployed at the point they entered treatment.

<sup>5</sup> 55.3% (268) of the 553 unemployable subjects were retired/ disabled. 32.4% (179) were homemakers and 12.3% (106) were students.

## BIVARIATE ANALYSES

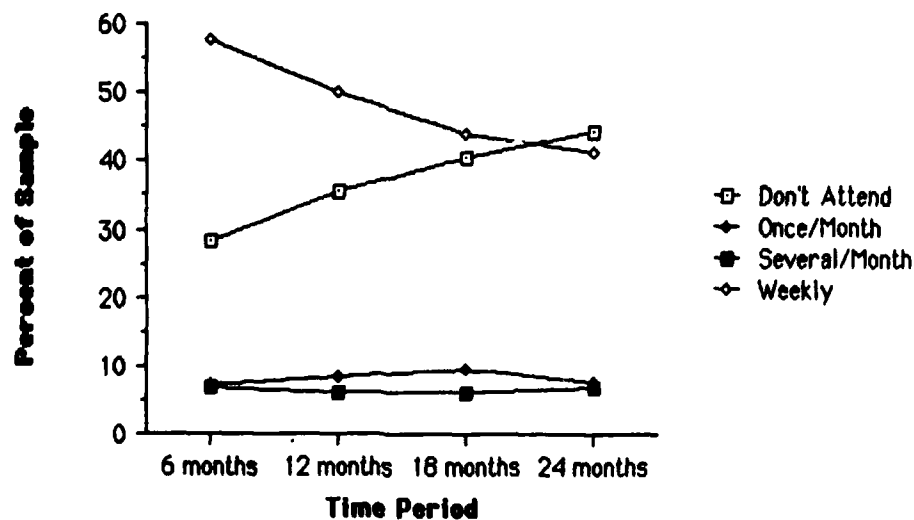
### OVERVIEW

The relationships among the two test variables, eleven outcome variables and eight control variables were explored using contingency tables and one-way analyses of variance. The purpose of approaching the data in this fashion was to gain some independent understanding of the importance of the three categories of variables prior to looking at their covariation in the multivariate analyses. As will be discussed in the next chapter, this separation of variables into test, control and outcome categories, heuristically served to clarify hypotheses regarding the relationships among the variables.

The bivariate analyses proceed in a logical fashion. The initial step looked at the relationship between AA attendance and aftercare over the two year time frame of this study. In the next step, the relationships between the two test variables and eight control variables were described. The third step looked at the relationship between the two test variables and the outcome variables. The final step of the bivariate analyses examined the relationship between the eight control variables and the only outcome variable (sobriety) for which significant relationships with the test variables could be demonstrated.

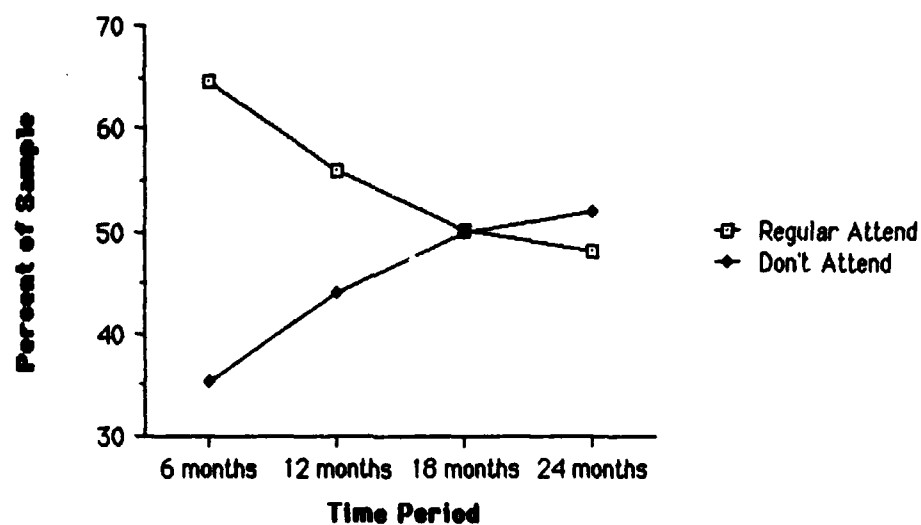
BIVARIATE ANALYSES: TEST VARIABLES ACROSS TIME

In this section the relationship between AA attendance and aftercare was explored in Tables 17 through Table 22. AA attendance was reported by a substantial number of subjects across the time frame of this study. In contrast, a much smaller group of subjects reported aftercare attendance, and for the most part, this attendance appeared to be limited to the first year of follow-up. A surprisingly large group of subjects reported not attending either AA or aftercare.

Table 17: AA Attendance by Time

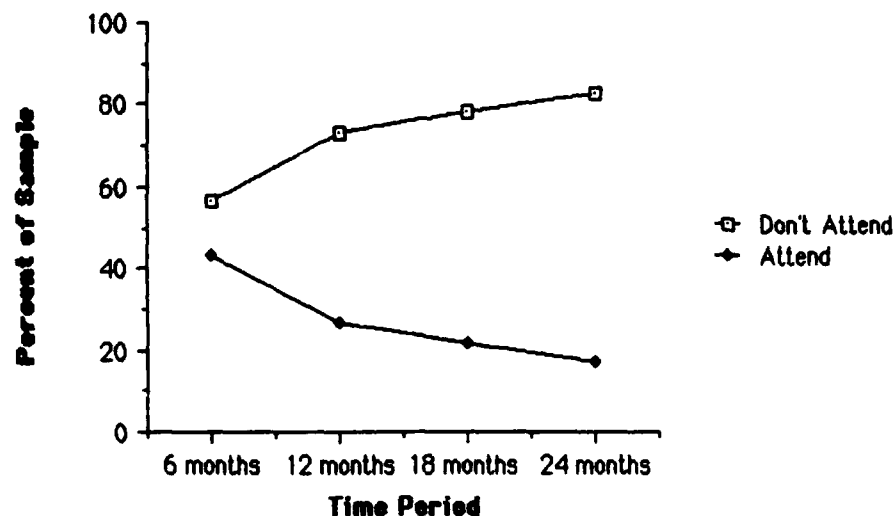
AA attendance was observed to be more stable than aftercare attendance as fewer subjects moved in and out of the AA attendance category, and hence, reported a higher rate of cumulative attendance. The data supported the argument that, for this sample, there was considerable interaction between AA attendance and aftercare. AA attendance appeared to reinforce aftercare attendance, while the reverse could not be demonstrated.

Table 18: AA Attendance (Dichotomized) by Time



AA attendance was not static over time. As can be seen in Table 17, there were three distinct attendance patterns. In the first pattern, a large group of subjects attended AA on a weekly basis. This group decreased in

Table 19: Aftercare Attendance by Time<sup>6,7</sup>



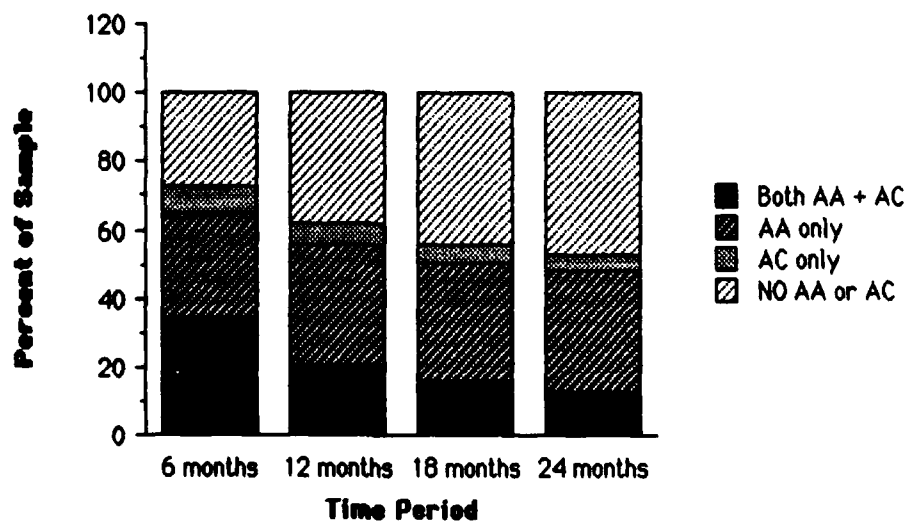
<sup>6</sup> Unlike the manner in which CATOR categorized the AA question, the aftercare question asked subjects to report whether they attended aftercare, did not attend aftercare, or completed aftercare. As only one answer was allowed for the question, "yes" responses and "completed" responses were combined into one category. The relative number of "completed" responses was very small for all four time periods (94- 42- 37- 32). The expectation of the aftercare program coordinators interviewed by the author was that clients would attend aftercare groups on a weekly basis. Distinguishing regular aftercare attendance from occasional or sporadic aftercare attendance would have been more desirable.

<sup>7</sup> Noel, McCrady, Stout, and Fisher-Nelson (1987) reported that "refusing treatment or dropping out before completion was the norm" in an outpatient alcoholism counseling program (p. 229).



size from 57.7% to 41.1% of the sample over the two-year time frame of this study. In the second pattern, a large group of subjects did not attend AA at all. This group increased in size from 28.1% to 44.3% of the sample over the two-year period. The third pattern is demonstrated by a small group of subjects who reported attending AA on a sporadic or occasional basis. This pattern remained fairly constant across the two-year time period.

Table 20: Crosstabulation of AA and Aftercare, by Time



The two patterns of either attending AA on a weekly basis or not at all accounted for the majority (approximately 85%) of the subjects'

responses. The four categories of AA attendance, depicted in Table 17, were subsequently collapsed to create a dichotomous variable which contrasted AA attenders with non-attenders (see Table 18). The AA attendance categories were collapsed to allow for the multivariate analysis which follows, as well as to permit a more intuitive interpretation of the remaining comparisons.

Collapsing the categories was accomplished by dividing the effect of the relatively small percentage of the sample who attended on a sporadic basis. Subjects who attended one time per month were assigned to the category of subjects not attending AA. Subjects who attended AA several times a month were reclassified as AA attenders. Slightly more sporadic attenders were reclassified as not attending AA than sporadic attenders who were reclassified as AA attenders.

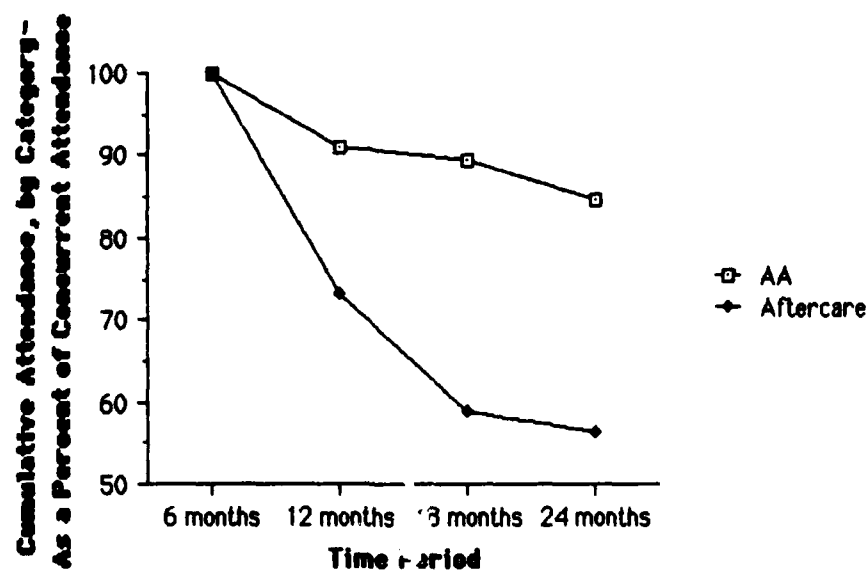
Table 19 shows that a majority of the subjects in this sample did not attend formal aftercare programs. Despite having formal programs with professional staff assigned to expedite the transition from inpatient treatment, only 43.1 percent of the subjects attended aftercare during the first 6-month time period following discharge from treatment. At the one-year point, only 26.3% of the clients were still attending aftercare programs. The drop-out rate slowed down during the second year of follow-up. Subjects still attending aftercare beyond 12 months remained, for the most part, in aftercare during the second year.<sup>8</sup>

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<sup>8</sup> As noted in the last chapter, aftercare and mental health treatment were not differentiated in the CATOR-III data. One hypothesis to consider is that most clients discontinued aftercare during their first year of follow-up. Clients who in the CATOR-III data pool, continued to report attending aftercare during the second follow-up year, were for the most part, reporting attendance in outpatient mental health services. Due to the lack of differentiation in question design, in CATOR-III aftercare and outpatient mental health treatment were confounded. CATOR-IV has been

Table 20 describes the crosstabulation of AA attendance with aftercare attendance over time. During the first six-month interval, 72.9% of the sample attended either AA, aftercare, or both activities. The number of subjects who reported attending some type of supportive service declined gradually over time. At the 24-month follow-up interview, 52.9% of the subjects still reported attending some type of supportive service.

Table 21: Stability of Attendance: Comparison of The Percent of Cumulative Attendance with Concurrent Attendance for AA Attendance and Aftercare<sup>9,10</sup>



redesigned so as to be able to assess the relative effects of aftercare and outpatient mental health treatment.

<sup>9</sup> AA attendance figures were calculated on a N = 2,912 due to 38 missing cases. There were no missing cases for aftercare attendance which used an N = 2,950.

<sup>10</sup>

Percent cumulative attendance = 
$$\frac{(\text{cumulative attendance carried over from prior 6 months})}{(\text{concurrent attendance of present 6 months})}$$

It appears that subjects who attended either AA only, or aftercare only remained fairly constant over the two-year time period, showing only a small change in attendance rates from 6 months to 24 months. The largest change in attendance rates occurred in the group which reported attending both AA and aftercare services. This group decreased in size from 34.7% of the sample at 6 months to 12.7% of the sample at 24 months. At the same time, the group which reported attending neither supportive service increased from 27.1% of the sample at 6 months to 47.4% of the sample at 24 months.

Table 22: Interaction between AA Attendance and Aftercare

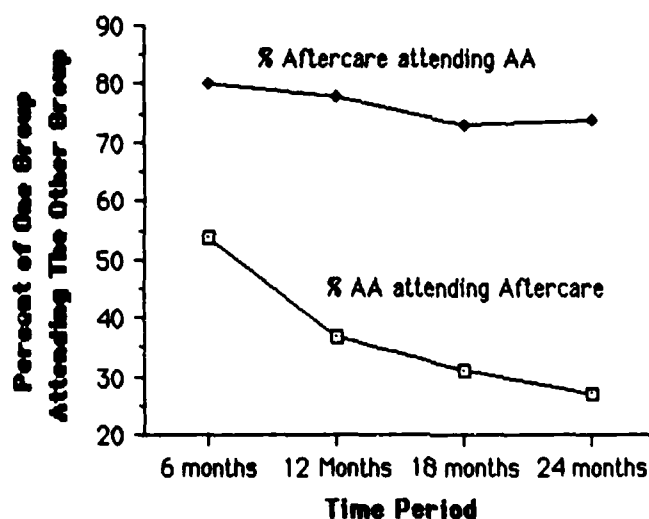


Table 21 examines movement between attendance categories for both AA attendance and aftercare attendance. Cumulative attendance carries

with it a connotation of stability. One indicator of the amount of stable attendance is to compare the cumulative attendance carried forward from the previous time period as a percent of the total concurrent attendance for a given time period. When the amount of cumulative attendance carried over from one time period to the next is relatively low when compared with the concurrent attendance, it indicates that there has been substantial movement between attendance categories from one time period to the next time period. When the amount of cumulative attendance is relatively high when compared with the concurrent attendance of the next time interval, the attendance can be considered to be stable, exhibiting little movement in or out of the attendance categories.

At the first follow-up interview, there were no differences for either AA attendance or aftercare attendance as the concurrent attendance levels were equivalent to the cumulative attendance levels at that point. Beginning with the second follow-up interval, however, it was apparent that AA attendance was more stable when compared with aftercare attendance. Table 21 shows that the rate of decline in the percent of cumulative attendance figures for AA attendance slowed in the second year. Aftercare attendance continued to show substantial decreases in the percent of cumulative attendance for each follow-up period for both years.

One measure of the relative influence of AA attendance on aftercare attendance can be seen in Table 22. The percent of AA attenders who also attended aftercare dropped off significantly at each follow-up interview. In contrast, subjects who attended aftercare, also tended to maintain relatively high levels of AA attendance. The AA attendance rates of aftercare attenders remained fairly constant across the four follow-up

intervals. For this sample, attending aftercare appeared to have reinforced AA attendance. The reverse could not be demonstrated. AA attendance did not appear to reinforce aftercare attendance.

# BIVARIATE ANALYSES: TEST VARIABLES BY CONTROL VARIABLES

Table 23: Summary of Analyses between the Control Variables  
and AA Attendance<sup>11</sup>

<u>Control Variables</u>	<u>AA Attendance</u>			
	<u>6 months</u>	<u>12 Months</u>	<u>18 Months</u>	<u>24 Months</u>
1. Age	n.a.	n.a.	n.a.	n.a.
2. Gender	n.a.	n.a.	n.a.	n.a.
3. Marital Status	n.a.	n.a.	n.a.	n.a.
4. Ethnicity	n.a.	n.a.	0	n.a.
5. Employability	0	n.a.	n.a.	n.a.
6. Previous CD Treatment	0	0	0	n.a.
7. Type of Substance	n.a.	n.a.	n.a.	n.a.
8. Education	n.a.	+	+	+

(n.a. =  $\chi^2$  not significant at 0.01)

(0 =  $\chi^2$  significant  $\leq 0.01$ , but  $\phi$  or Cramer's V  $< 0.10$ )<sup>12, 13</sup>

(+ = positive relationship with  $\chi^2$  significant  $\leq 0.01$ , and  $\phi$  or Cramer's V  $\geq 0.10$ )

(- = negative relationship with  $\chi^2$  significant  $\leq 0.01$ , and  $\phi$  or Cramer's V  $\geq 0.10$ )

<sup>11</sup> See Appendix E-1 for the specific data which are summarized in this table.

<sup>12</sup> Cramer's V is considered to be a "slightly modified version" of  $\phi$  (Nie et al., 1975, p. 224). Cohen (1969), quoted in Howell, 1982, describes a small effect as  $\phi = .10$ , a medium effect  $\phi = .25$ , and a large effect  $\phi = .40$ .

<sup>13</sup> In large data sets, the greater the N, the less the difference between the two variables is required to reach statistical significance. Consequently in a sample of this size (N = 2,950), it is possible to obtain a significant Chi Square Test between two variables, when in fact, the proportional difference between the two variables, as reported by  $\phi$  or Cramer's V is very small. (Paraphrase of a conversation between the author and Dr. Norman G. Hoffmann, Spring Quarter, 1988).

Table 24: Summary of Analyses between the Control Variables  
and Aftercare Attendance<sup>14</sup>

<u>Control Variables</u>	<u>Aftercare Attendance</u>			
	<u>6 months</u>	<u>12 Months</u>	<u>18 Months</u>	<u>24 Months</u>
1. Age	n.a.	n.a.	n.a.	n.a.
2. Gender	+ <sup>a</sup>	+ <sup>a</sup>	+ <sup>a</sup>	+ <sup>a</sup>
3. Marital Status	0	n.a.	n.a.	n.a.
4. Ethnicity	n.a.	n.a.	n.a.	n.a.
5. Employability	0	n.a.	n.a.	n.a.
6. Previous CD Treatment	n.a.	n.a.	n.a.	n.a.
7. Type of Substance	0	0	0	+ <sup>b</sup>
8. Education	n.a.	n.a.	+	+

(<sup>a</sup> Male = 0, Female = 1)

(<sup>b</sup> alcohol only = 0, mixed drugs and alcohol = 1, drugs only = 2)

(n.a. = X<sup>2</sup> not significant at 0.01)

(0 = X<sup>2</sup> significant  $\leq 0.01$ , but  $\phi$  or Cramer's V < 0.10)

(+ = positive relationship with X<sup>2</sup> significant  $\leq 0.01$ , and  $\phi$  or Cramer's V  $\geq 0.10$ )

(- = negative relationship with X<sup>2</sup> significant  $\leq 0.01$ , and  $\phi$  or Cramer's V  $\geq 0.10$ )

This section begins with two summary tables (Tables 23 and Table 24) which suggest that, for this sample, there was very little interaction between the control variables and either AA attendance or aftercare. Tables 25 through Table 30 examine in detail the relationships between the two test variables and the control variables for which statistically significant relationships with acceptable measures of

<sup>14</sup> See Appendix E-2 for the specific data which are summarized in this table.



association could be identified.<sup>15,16,17</sup> Tables 25 through Table 30 graphically depict 2 X 2 contingency tables. All cells are presented in order to underscore the point that the difference in the test variable categories accounted for a substantially larger portion of the relationship than did the difference in the control variable categories.

Overall, Table 23 and Table 24 show that the relationships between the control variables and the two test variables were generally fairly weak. This suggests that, for the most part, there was relatively little interaction between the control variables and either aftercare or AA attendance. Age did not differentiate attendance for either AA or aftercare. Level of education was the only control variable which demonstrated a significant relationship with both test variables across time. The remaining control variables appeared to have a differential effect, depending on which test variable was being discussed.

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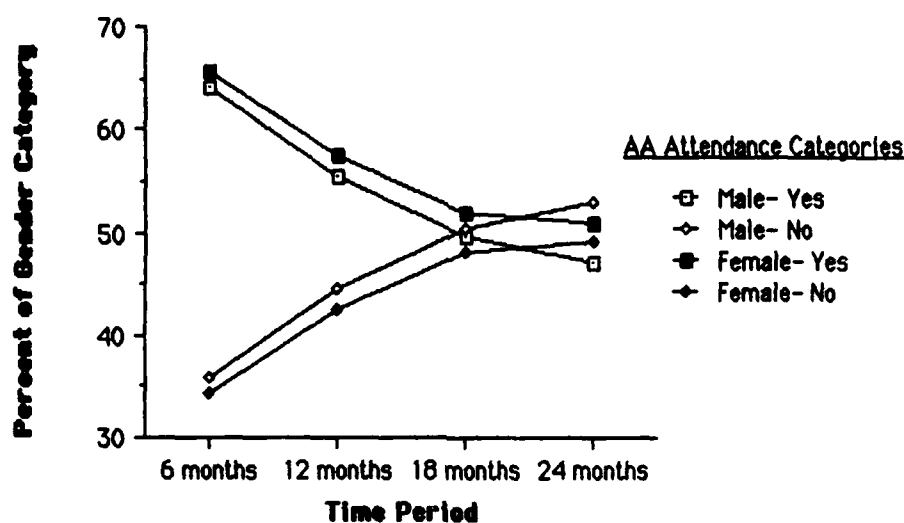
<sup>15</sup> As will be discussed later in this chapter, an identified relationship between two variables had to be both statistically significant and explain a measurable portion of the variance in the dependent variable, for the relationship to be considered important.

Cramer's V can be interpreted as:  $\phi' = \sqrt{\frac{\phi^2}{L-1}}$ , where L is either the number of rows or columns, whichever is less.

<sup>16</sup> Describing the magnitude of association in nominal data can be problematic. While a 2X2 contingency table produces a  $\phi$ , where the  $\phi^2$  is comparable in meaning to  $R^2$ , for larger contingency tables it is difficult to come up with a meaningful measure of the magnitude of association (Hays, 1981, pp. 555- 559).

<sup>17</sup> For nominal data, it is not possible to determine from the magnitude of association measure where the significance of the relationship between a large number of categories lies, only that a relationship is present within the data. While the relationships will be described descriptively, for the sake of discussion with the later ANOVA summary tables, (Table 31 and Table 32), a chi square must also produce a  $\phi$  or a Cramer's V of at least 0.10 to be considered to reflect an important relationship, as opposed to possibly being a spurious relationship due to the large sample size.

Table 25: AA Attendance by Gender



(06 months)  $\chi^2$  (3 df) = 6.98 (NS)

Cramer's V = 0.049

(12 months)  $\chi^2$  (3 df) = 4.84 (NS)

Cramer's V = 0.040

(18 months)  $\chi^2$  (3 df) = 5.24 (NS)

Cramer's V = 0.042

(24 months)  $\chi^2$  (3 df) = 5.85 (NS)

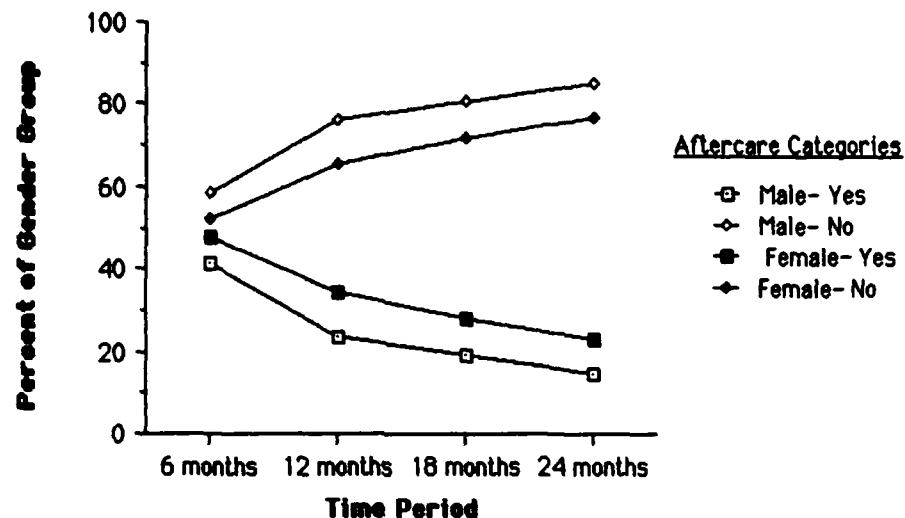
Cramer's V = 0.045

Critical value with 3 df: 11.34

Three variables( marital status, ethnicity, and employability) listed in Tables 23 and Table 24 demonstrated very weak relationships with the test variables. Although producing statistically significant Chi Square Tests, there was so little association between the test variables and the three control variables as to make interpretation of the relationships meaningless. For this reason, the individual relationships are not presented graphically. The specific data can be found in Appendices E-1 and E-2.<sup>18</sup>

<sup>18</sup> Marital status only correlated with aftercare in the first follow-up interval, and did not correlate at all with AA attendance. Ethnicity was correlated with AA attendance in the third follow-up interval only, and did not correlate at all with aftercare. In a similar fashion

Table 26: Aftercare Attendance by Gender



(06 months)  $\chi^2$  (2 df) = 11.24  
 (12 months)  $\chi^2$  (2 df) = 35.36  
 (18 months)  $\chi^2$  (2 df) = 30.87  
 (24 months)  $\chi^2$  (2 df) = 32.76

Cramer's V = 0.062  
 Cramer's V = 0.110  
 Cramer's V = 0.102  
 Cramer's V = 0.106

Critical value with 2 df: 0.01 = 9.21

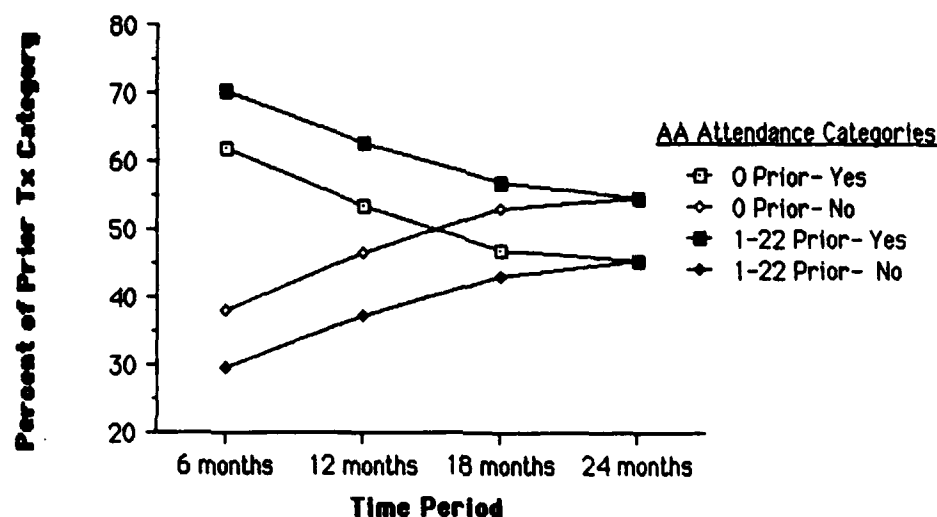
The relationship between the subjects' gender and both test variables was intriguing (see Tables 25 and 26). As was described in an earlier section of this study, it was expected that subjects' gender and AA attendance would show a significant correlation with significantly fewer women attending AA. This, however, was not the case. In this sample, subjects' gender (Table 25) did not correlate with AA attendance at any

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employability was statistically significant for both aftercare and AA attendance only in the first follow-up period.

point in time. What is particularly interesting to note in Table 25, was that the women, rather than not attending AA, had rates which were consistently above the males, even though the difference was not statistically

Table 27: AA Attendance by Previous CD TX Admissions



(06 months)  $\chi^2$  (39 df) = 68.75

Cramer's V = 0.090

(12 months)  $\chi^2$  (39 df) = 63.06

Cramer's V = 0.085

(18 months)  $\chi^2$  (39 df) = 62.70

Cramer's V = 0.085

(24 months)  $\chi^2$  (39 df) = 59.78 (NS)

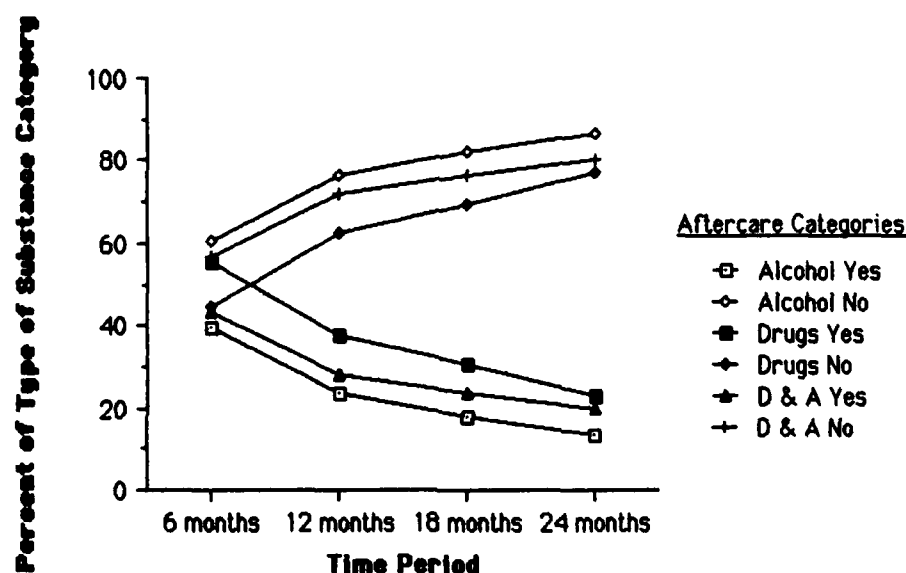
Cramer's V = 0.083

Critical Value with 39 df: 0.01 = 62.10

significant. This pattern is even more clearly evident in the relationship between subjects' gender and aftercare attendance (see Table 26). In this case, the difference is statistically significant at  $\alpha = 0.01$  for all four follow-up intervals. It should be noted, however, that the relative size of the measure association is small indicating only a small degree of association between aftercare attendance and gender.

Comparing the graphs in Tables 25 and Table 26 it was evident that both men and women reported significantly higher AA attendance rates than aftercare attendance rates. For aftercare, both men and women demonstrate

Table 28: Aftercare Attendance by Type of Substance Use



(06 months)  $\chi^2$  (2 df) = 20.69

Cramer's V = 0.08

(12 months)  $\chi^2$  (2 df) = 22.07

Cramer's V = 0.09

(18 months)  $\chi^2$  (2 df) = 23.19

Cramer's V = 0.09

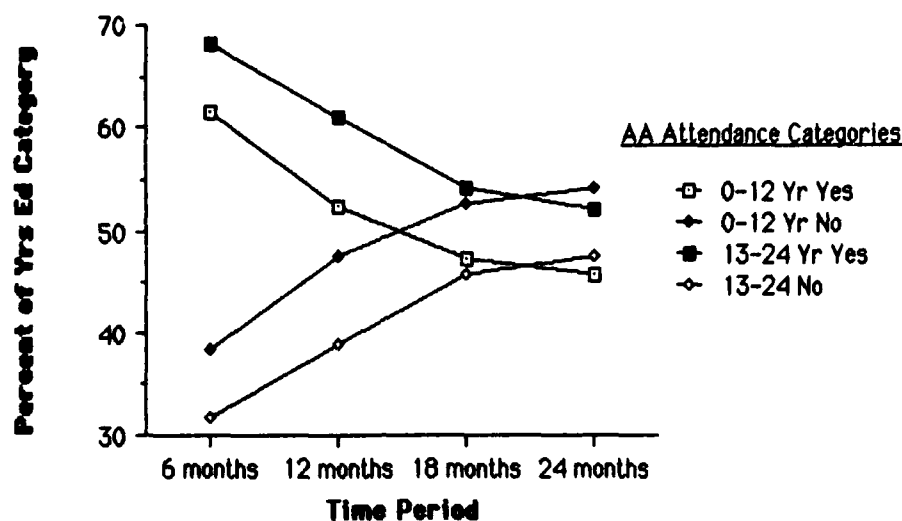
(24 months)  $\chi^2$  (2 df) = 27.87

Cramer's V = 0.10

Critical value with 2 df: 0.001 = 13.82

a steady decline in attendance across the two year time frame. The rate of decline for AA attendance appeared to slow down in the second year.

Table 29: AA Attendance by Years of Education



(06 months)  $\chi^2$  (24 df) = 35.13 (NS)

Cramer's V = 0.112

(12 months)  $\chi^2$  (24 df) = 60.15

Cramer's V = 0.147

(18 months)  $\chi^2$  (24 df) = 49.08

Cramer's V = 0.133

(24 months)  $\chi^2$  (24 df) = 52.35

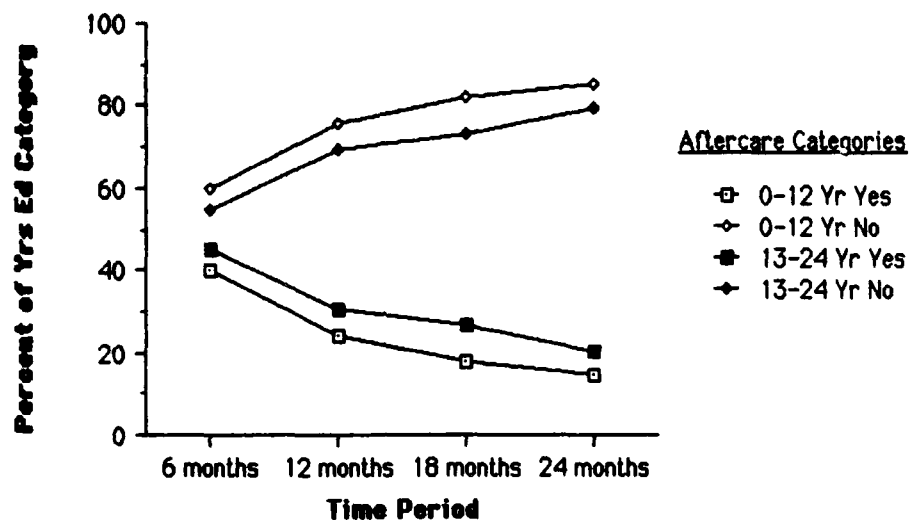
Cramer's V = 0.137

Critical value with 24 df: 0.01 = 42.98

Previous admissions for chemical dependency treatment did not correlate with aftercare attendance, but were correlated with AA attendance in three of the four follow-up periods (see Table 27). As a dichotomous variable, reporting any previous admissions was significantly correlated with regular AA attendance. For both categories of the variable, the same general decline in the relative percentage of the sample attending AA was noted over the two year time frame. The Cramer's V statistics indicated that, while the relationship was statistically significant, there

was little association between previous admissions for chemical dependency treatment and AA attendance.

Table 30: Aftercare Attendance by Years of Education



(06 months)  $\chi^2$  (24 df) = 32.04 (NS)

Cramer's V = 0.107

(12 months)  $\chi^2$  (24 df) = 42.19 (NS)

Cramer's V = 0.123

(18 months)  $\chi^2$  (24 df) = 45.57

Cramer's V = 0.128

(24 months)  $\chi^2$  (24 df) = 48.44

Cramer's V = 0.132

Critical value with 24 df: 0.01 = 42.98

The type of substance abuse correlated with aftercare attendance but not AA attendance (see Table 28). Subjects who reported "drug abuse only" had the highest aftercare attendance rates, while the subjects who reported "alcohol abuse only" had the lowest rates of aftercare attendance. "Mixed

alcohol and drug abuse" correlated with aftercare attendance at a rate in between the other two categories. Across the four follow-up intervals, the aftercare attendance rates within each type of substance category declined. The influence of type of substance, however, continued to affect aftercare attendance across the two year time period. Although the same general patterns were noted, the correlation between type of substance and AA attendance was not statistically significant.

Years of education was the only control variable to show a consistent correlative relationship with both aftercare attendance and AA attendance for more than one follow-up interval. Beginning at the 12-month follow-up interview, subjects with at least one year of post high school education consistently reported higher rates of regular AA attendance (see Table 29). This pattern was statistically significant for the last three follow-up periods. After subjects' age, years of education accounted for most of the explained variance in AA attendance.

While the same general pattern is noted in the relationship between years of education and aftercare, the correlations were only statistically significant in the second year (see Table 30). For both educational categories a larger percentage of subjects attended AA as opposed to aftercare. Most subjects, regardless of their education, stop attending aftercare within the first year of follow-up. For both educational categories the drop out rate tended to be spread out and at a slower rate for AA attendance, with more subjects remaining with AA over the two year time frame.



### BIVARIATE ANALYSES: TEST VARIABLES AND OUTCOME VARIABLES

Tables 31 and Table 32 summarize the relationships between the two test variables and the eleven outcome variables. Overall, AA attendance and aftercare were unrelated to ten of the eleven outcome variables. AA attendance produced one weak correlation with the number of injuries for one follow-up period. Aftercare also produced several weak correlations with part-time employment, and one weak correlation with welfare assistance. All of the weak correlations resulted in measures of association that were so small as to make the relationships meaningless. In contrast, both AA attendance and aftercare were significantly associated with sobriety across the time frame of the study and resulted in small to moderate measures of the magnitude of association.

The bivariate analyses of the relationships between the two test variables and 11 selected outcome variables were conducted using SPSS subprogram ANOVA.<sup>19</sup> The 11 outcome variables, as criterion variables, were measured on an interval scale. Both AA attendance and aftercare attendance, as the independent variables, were nonmetric (categorical) variables. Table 31 and Table 32 summarize the findings of the ANOVAs.

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<sup>19</sup> As originally conceptualized, this design had planned to take advantage of the interval quality of many of the outcome variables and use analysis of variance to explicate the relationships among the variables. As the actual data analysis progressed, it became evident that crosstab analysis, while losing the interval quality of the data, allowed for a more intuitive interpretation of the data, and was better suited for the purposes of this study. Consequently the first data runs on the computer utilized SPSS ANOVA while later data runs used SPSS CROSSTABS. Several ANOVAs were subsequently rerun on CROSSTABS with no differences noted in terms of significance of outcome.

Table 31: Summary of Analyses between AA Attendance  
and 11 Outcome Variables<sup>20</sup>

<u>Outcome Variables</u>	<u>AA Attendance</u>			
	<u>6 months</u>	<u>12 Months</u>	<u>18 Months</u>	<u>24 Months</u>
1. Full-time Employment	n.a.	n.a.	n.a.	n.a.
2. Part-time Employment	n.a.	n.a.	n.a.	n.a.
3. Received Welfare Assistance	n.a.	n.a.	n.a.	n.a.
4. Received Disability Assistance	n.a.	n.a.	n.a.	n.a.
5. Hospitalized for Medical Problems	n.a.	n.a.	n.a.	n.a.
6. Visits to the Emergency Room	n.a.	n.a.	n.a.	n.a.
7. Injuries	n.a.	0	n.a.	n.a.
8. Hospitalized for Emotional Problems	n.a.	n.a.	n.a.	n.a.
9. Alcohol related misdemeanors	n.a.	n.a.	n.a.	n.a.
10. Alcohol related felonies	n.a.	n.a.	n.a.	n.a.
11. Sobriety	+a	+a	+a	+a

(a not sober = 0, sober = 1)

(n.a. = F-test not significant at 0.01)

(0 = F-test significant  $\leq 0.01$ , but  $R^2 < 0.01$ )

(+ = positive relationship with F-test significant  $\leq 0.01$ , and  $R^2 \geq 0.01$ )

(- = negative relationship with F-test significant  $\leq 0.01$ , and  $R^2 \geq 0.01$ )

Two criteria were selected for determining the presence of a significant relationship between a test variable and an outcome variable. First, the resulting F-test had to be statistically significant at  $\alpha \leq 0.01$ . Second, the statistically significant relationship had to result in an  $R^2 \geq 0.01$ , i.e., account for at least one percent of the explained variance in the

<sup>20</sup> See Appendix E-3 for the specific data which are summarized in this table.

dependent variable. Both criteria had to be met for a relationship between the test variable and outcome variable to be considered important.

Table 32: Summary of Analyses between Aftercare Attendance and 11 Outcome Variables<sup>21</sup>

<u>Outcome Variables</u>	<u>Aftercare Attendance</u>			
	<u>6 months</u>	<u>12 Months</u>	<u>18 Months</u>	<u>24 Months</u>
1. Full-time Employment	n.a.	n.a.	n.a.	n.a.
2. Part-time Employment	0	n.a.	0	n.a.
3. Received Welfare Assistance	n.a.	n.a.	0	n.a.
4. Received Disability Assistance	n.a.	n.a.	n.a.	n.a.
5. Hospitalized for Medical Problems	n.a.	n.a.	n.a.	n.a.
6. Visits to the Emergency Room	n.a.	n.a.	n.a.	n.a.
7. Injuries	n.a.	n.a.	n.a.	n.a.
8. Hospitalized for Emotional Problems	n.a.	n.a.	n.a.	0
9. Alcohol related misdemeanors	n.a.	n.a.	n.a.	n.a.
10. Alcohol related felonies	n.a.	n.a.	n.a.	n.a.
11. Sobriety	+ <sup>a</sup>	+ <sup>a</sup>	0	0

(<sup>a</sup> not sober = 0, sober = 1)

(n.a. = F-test not significant at 0.01)

(0 = F-test significant  $\leq 0.01$ , but  $R^2 < 0.01$ )

(+ = positive relationship with F-test significant  $\leq 0.01$ , and  $R^2 \geq 0.01$ )

(- = negative relationship with F-test significant  $\leq 0.01$ , and  $R^2 \geq 0.01$ )

Table 31 summarizes the ANOVAs between AA attendance and the 11 outcome variables. Generally speaking, attending AA did not influence outcomes in 10 of the 11 dependent variables. AA attendance did influence

<sup>21</sup> See Appendix E-4 for the specific data which are summarized in this table.

the number of injuries reported for one follow-up interval at the 12 month interview. While statistically significant at  $\alpha = .001$ , the small difference in the mean number of injuries during the second follow-up interval resulted in a  $R^2$  of 0.007.<sup>22</sup> In other words, the difference, while statistically significant, accounted for such a small portion of the variance in the dependent variable, that the findings were essentially irrelevant.

For the most part same patterns were observed in the relationship between aftercare attendance and 10 of the 11 outcome variables (see Table 32). Aftercare, however, did produce statistically significant relationships with part-time employment, welfare assistance, and hospitalization for one or more follow-up intervals. The statistically significant relationships did not account for at least one percent of the explained variance in the dependent variable. Overall, with the clear exception of sobriety, aftercare did not exert an influence on the outcome variables.

In marked contrast to the other outcome variables, AA attendance (Table 31) was significantly related to the number of months of sobriety across the entire time period of this study. Aftercare attendance (Table 32) was also significantly related to sobriety across the four follow-up intervals, and resulted in significant  $R^2$ s in two of the four time periods. For both test variables, the significance levels of the F-tests across the time period were  $\alpha = 0.001$ . Comparing AA attendance with sobriety produced  $R^2$ s ranging from 0.061 to 0.10 over the two year time period of

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<sup>22</sup> For example, at the 12 month interview, 1,019 subjects who did not attend AA had a mean number of injuries = 0.26. 239 subjects who attended AA once a month had a mean number of injuries = 0.30. 168 subjects who attended AA several times a month had a mean number of injuries = 0.91. 1,458 subjects who attended AA weekly had a mean number of injuries = 0.36. The F-test was statistically significant, but accounted for very little in terms of "actual" or "real" differences.

the study. The comparison of aftercare attendance with sobriety produced  $R^2$ s ranging from 0.008 to 0.021 over the two year time period of this study.<sup>23</sup>

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<sup>23</sup> The ANOVAs utilized the interval quality of the dependent variable and looked at the number of months of sobriety, ranging from 0- 6 within each follow-up interval. When the variable categories were collapsed into dichotomies for CROSSTABs, the resulting  $\phi$  were comparable with the  $R^2$  from the ANOVA analyses. In other words, it did not appear that collapsing the variables resulted in any loss of significant data.

BIVARIATE ANALYSES: CONTROL VARIABLES AND SOBRIETY

Table 33 summarizes the relationships between the eight control variables and sobriety as an outcome variable. Tables 34 through Table 37 describe the relationships between sobriety and the control variables for which a significant relationship could be demonstrated. Overall, the impact of the control variables was more relevant to a discussion of sobriety than to the test variables. It was particularly interesting to note that, while the control variables are relevant to a discussion of sobriety, their effect was isolated, and did not extend to either of the test variables to any significant degree.

As noted earlier in the relationship between the control variables and the test variables, Tables 34 through 37 show that sobriety added more to our understanding of the relationship under examination than did the contribution of the particular control variable under consideration. The relatively weak contribution of the control variables to our understanding of sobriety can be seen in the measures of association statistics which accompany the graphs.

Gender, ethnicity, employability, and education did not demonstrate a consistent relationship with sobriety across the follow-up intervals of this study (see Table 33). Marital status and type of substance were statistically related to sobriety over the time frame of the study, but only produced weak measures of association. Age and previous treatment for chemical dependency were significantly related to sobriety and produced small, but measurable, measures of association.

Table 33: Summary of Analyses between the Control Variables  
and Sobriety<sup>24</sup>

<u>Control Variables</u>	<u>Sobriety<sup>25</sup></u>			
	<u>6 months</u>	<u>12 Months</u>	<u>18 Months</u>	<u>24 Months</u>
1. Age	+	+	+	+
2. Gender	n.a.	n.a.	0	n.a.
3. Marital Status	+a	0	+a	+a
4. Ethnicity	n.a.	n.a.	n.a.	n.a.
5. Employability	n.a.	n.a.	n.a.	n.a.
6. Previous CD Treatment	+b	+b	+b	n.a.
7. Type of Substance	+c	0	+c	0
8. Education	n.a.	+	n.a.	n.a.

(a single = 0, separated = 1, together = 2)

(b none = 0, one or more = 1)

(c alcohol only = 0, mixed drugs and alcohol = 1, drugs only = 2)

(n.a. =  $\chi^2$  not significant at 0.01)

(0 =  $\chi^2$  significant  $\leq 0.01$ , but  $\phi$  or Cramer's  $V < 0.10$ )

(+ = positive relationship with  $\chi^2$  significant  $\leq 0.01$ , and  $\phi$  or Cramer's  $V \geq 0.10$ )

(- = negative relationship with  $\chi^2$  significant  $\leq 0.01$ , and  $\phi$  or Cramer's  $V \geq 0.10$ )

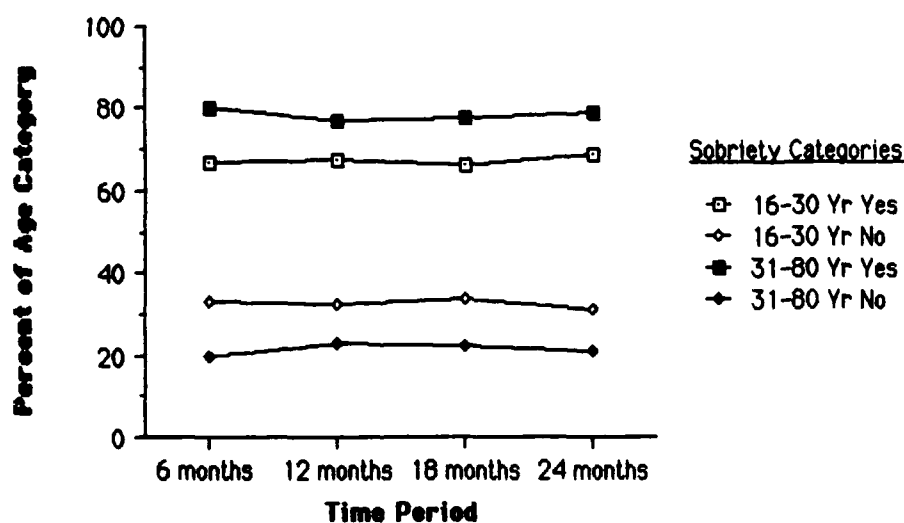
Table 34 shows that the sobriety rates for both age categories were fairly stable over the two years. Subjects, aged 30 and younger, were less likely to report sobriety. The relative stability of the graph would suggest

<sup>24</sup> See Appendix E-5 for the specific data which are summarized in this table.

<sup>25</sup> Sobriety was dichotomized as either "sober" or "not sober" in the bivariate comparisons with the control variables. "Sober" was defined as six continuous months of sobriety during a follow-up interval. Anything less than complete sobriety was considered to be "not sober". Clearly, as defined, sobriety is a conservative estimate of abstinence from alcohol as it does not take into consideration any shorter periods of abstinence during a follow-up interval.

that, for this sample, the contribution of age to the differences in sobriety rates was fairly constant. The relationship between sobriety and age graphed in Table 34 would suggest that a subject's reporting or not reporting sobriety contributed more to the statistical association than to which age category a subject belonged. Within each category of sobriety (sober versus not sober) the contribution of age would appear to account for about a 12%- 15% difference in the reported sobriety rates.

Table 34: Sobriety by Age



(06 months)  $\chi^2$  (64 df) = 141.67

Cramer's V = 0.219

(12 months)  $\chi^2$  (64 df) = 117.98

Cramer's V = 0.200

(18 months)  $\chi^2$  (64 df) = 135.41

Cramer's V = 0.214

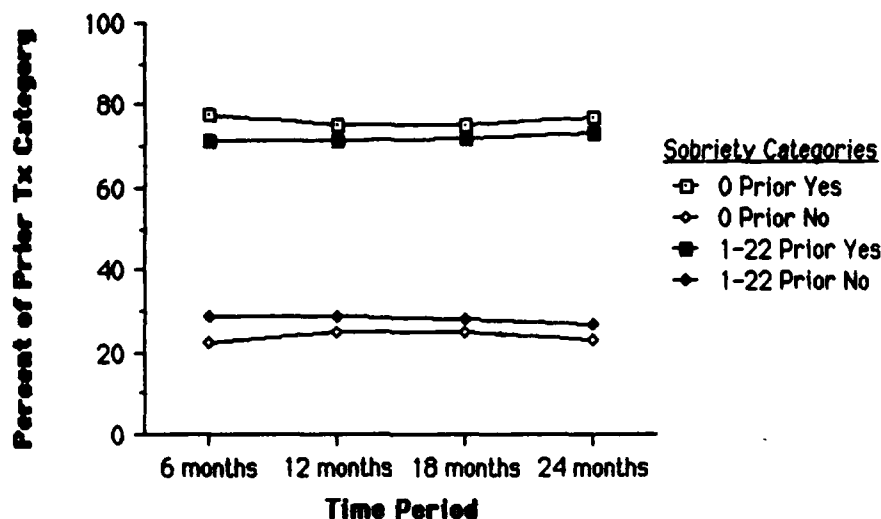
(24 months)  $\chi^2$  (64 df) = 120.81

Cramer's V = 0.202

Critical value with 64 df: 0.001 = 106.25



Table 35: Sobriety by Previous Admissions for CD Treatment

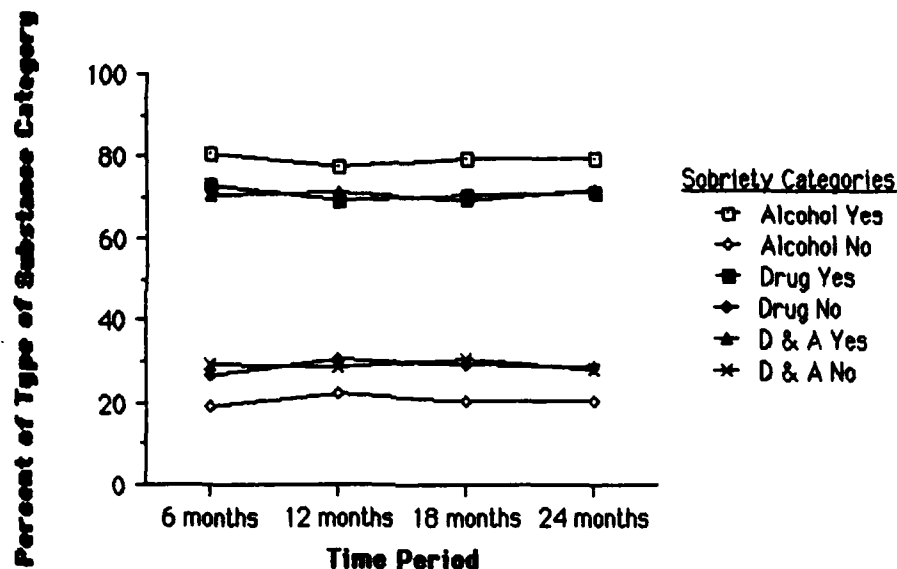


(06 months)  $\chi^2$  (13 df) = 55.39  
 (12 months)  $\chi^2$  (13 df) = 37.70  
 (18 months)  $\chi^2$  (13 df) = 36.25  
 (24 months)  $\chi^2$  (13 df) = 16.93 (NS)

Cramer's V = 0.139  
 Cramer's V = 0.115  
 Cramer's V = 0.112  
 Cramer's V = 0.077

Critical value with 13 df: 0.01 = 27.69

Table 35 shows that the majority of the statistically significant relationship between the number of previous admissions for chemical dependency treatment and sobriety was the result of the influence of sobriety rather than the number of previous admissions. With the exception of the first follow-up period, the influence of the control variable was relatively small, and did not extend past the 18 month follow-up interview. Within each category of sobriety, the number of previous admissions resulted in a change in the sobriety rates of less than 10%. This relationship was relatively stable as demonstrated in Table 35.

Table 36: Sobriety by Type of Substance

(06 months)  $\chi^2$  (2 df) = 37.04

Cramer's V = 0.114

(12 months)  $\chi^2$  (2 df) = 16.54

Cramer's V = 0.076

(18 months)  $\chi^2$  (2 df) = 33.37

Cramer's V = 0.108

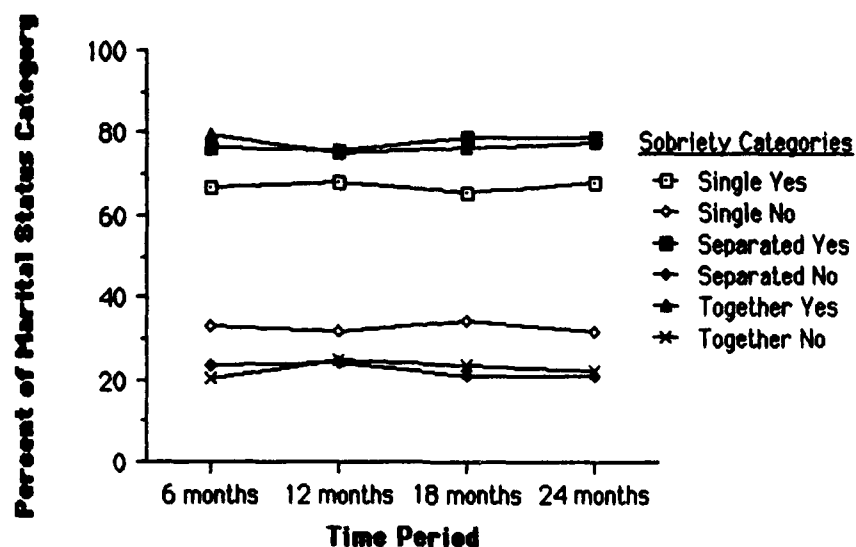
(24 months)  $\chi^2$  (2 df) = 22.24

Cramer's V = 0.088

Critical value with 2 df: 0.001 = 13.82

Subjects whose involvement was limited to alcohol fared better than did subjects who mixed alcohol with other drugs, or abused other drugs only (see Table 36). Subjects who mixed drugs and alcohol produced sobriety rates which were more similar to the "drug abuse only" subjects than to the "alcohol only" subjects. The magnitude of association between the two variables was small, which suggested that the interaction between the two variables did not contribute very much to the subjects' reports of sobriety.

Table 37: Sobriety by Marital Status

(06 months)  $\chi^2$  (5 df) = 46.31

Cramer's V = 0.126

(12 months)  $\chi^2$  (5 df) = 16.07

Cramer's V = 0.074

(18 months)  $\chi^2$  (5 df) = 34.48

Cramer's V = 0.108

(24 months)  $\chi^2$  (5 df) = 28.27

Cramer's V = 0.098

Critical Value with 5 df: 0.01 = 15.09

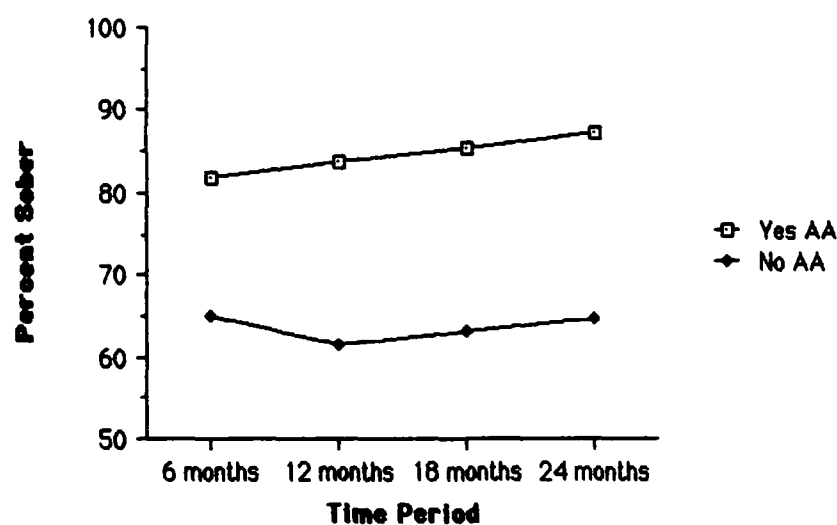
As noted in the previous graphs depicting the relationship between the control variables and sobriety, sobriety appeared to contribute more to the relationship than did the type of substance chosen. Within each category of sobriety, "alcohol only", as the type of substance resulted in a change in the sobriety rates of approximately 10% when compared to the other two types of substance categories. Within each category of sobriety there were no apparent differences between the remaining types of substance categories, i.e., "drugs only" and "mixed drugs and alcohol."

The relationship between marital status and sobriety followed the patterns described above for the other control variables. Sobriety provided a greater influence on the relationship than did marital status. Table 37 suggests that both "separated" and "together" were fairly stable, with "single" showing a little more variation. The difference between "single" and the other two categories accounted for about 10% change in the sobriety rates. This difference remained fairly stable across the four follow-up intervals.

# BIVARIATE ANALYSES: TEST VARIABLES AND SOBRIETY

Both AA attendance and aftercare were significantly related to sobriety across the time periods of this study. The measure of association for the relationship with AA attendance was substantially larger than was the measure of association with aftercare. Controlling for AA attendance,

Table 38: Sobriety by AA Attendance



(06 months)  $\chi^2$  (1 df) = 100.89

Phi = .186

(12 months)  $\chi^2$  (1 df) = 184.84

Phi = .252

(18 months)  $\chi^2$  (1 df) = 189.16

Phi = .255

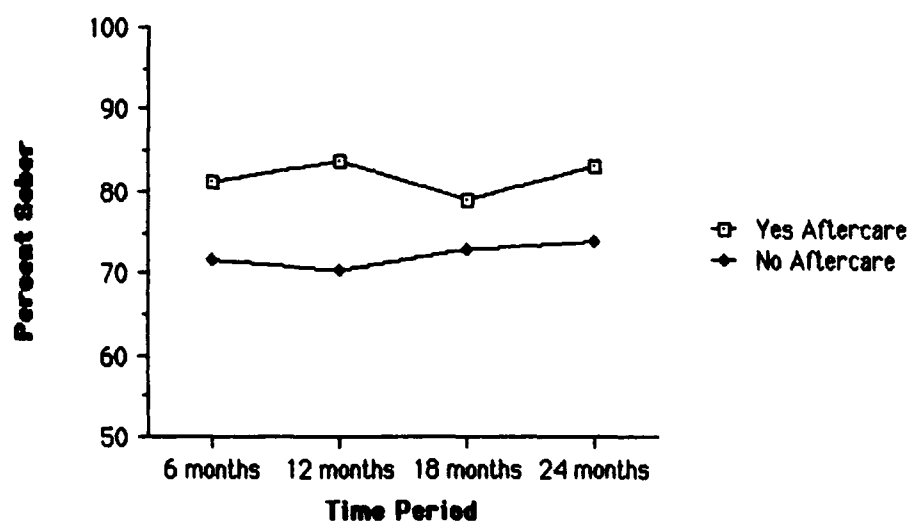
(24 months)  $\chi^2$  (1 df) = 198.05

Phi = .260

Critical value with 1 df: 0.01 = 6.63

the relationship between aftercare and sobriety was ambiguous at best and did not explain at least one percent of the variance in the dependent variable. As stated previously, clarifying aftercare attendance by the

Table 39: Sobriety by Aftercare Attendance



(06 months)  $\chi^2 (1 \text{ df}) = 34.95$

Phi = 0.110

(12 months)  $\chi^2 (1 \text{ df}) = 53.26$

Phi = 0.135

(18 months)  $\chi^2 (1 \text{ df}) = 9.94$

Phi = 0.059<sup>26</sup>

(24 months)  $\chi^2 (1 \text{ df}) = 18.40$

Phi = 0.080

Critical value with 1 df: 0.01 = 6.64

addition of the variable, "intensity of aftercare services," did not improve the explanatory power of aftercare in relation to sobriety.

<sup>26</sup> Although the chi square test for the relationship between aftercare attendance and sobriety was statistically significant, the measure of association (e.g., at 18 months,  $\phi^2 = 0.003$ ) was so small as to make it irrelevant.

A moderately strong relationship is evident in Table 38, between attending AA within each follow-up period and the subjects' reports of successfully maintaining their sobriety during the same follow-up period. The difference in outcome between attending and not attending AA was quite pointed. Subjects who did not attend AA appeared to struggle to maintain their sobriety at a level averaging 20% below that of the subjects who attended AA. In contrast, subjects who attended AA show a gradual improvement in their sobriety rates, improving from 81.7% to 87.2% over the two year time frame.

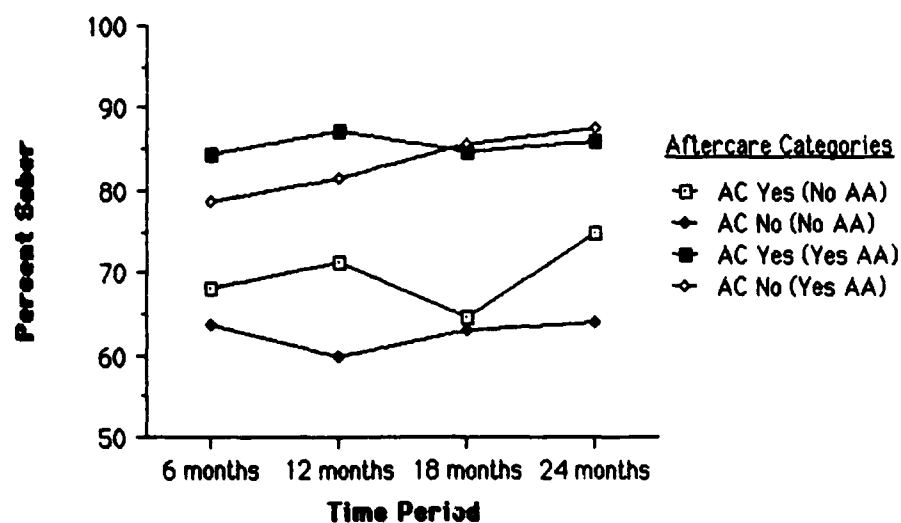
With the exception of the initial follow-up interview where the difference in sobriety rates between the two categories of AA attendance was only 16.7%, the 20% difference in sobriety rates between the AA attendance categories was maintained across the four time intervals. While the measure of association between AA attendance and sobriety was relatively strong in comparison to the rest of the findings of this study, the proportion of variance in the dependent variable being accounted for by the independent variable was still relatively low. AA attendance accounted for only between 3.5% and 6.8% of the explained variance in sobriety, leaving the majority of variance remaining to be explained.<sup>27</sup>

The relationship between attending aftercare and sobriety was not as clear-cut nor as strong as was the relationship between AA attendance and aftercare (see Table 39). The subjects who did not attend aftercare showed the same struggle to maintain their rates of sobriety as did the previously described subjects who did not attend AA. In contrast to the earlier

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<sup>27</sup> In a 2 X 2 contingency table,  $\phi^2 = r^2$ , and measured the magnitude of the association between the two variables in terms of the amount of explained variance in the dependent variable. (Hays, 1981, p. 557).

Table 40: Sobriety by Aftercare, Controlling for AA Attendance



<u>Time Period</u>	<u>AA Attendance- Yes</u>		<u>AA Attendance- No</u>	
	<u>Chi Square</u>	<u>Phi</u>	<u>Chi Square</u>	<u>Phi</u>
(06 months)	1.64	0.04	10.26	0.07
(12 months)	8.23	0.08	9.15	0.08
(18 months)	0.20	0.01	0.15	0.00
(24 months)	6.73	0.06	0.57	0.02

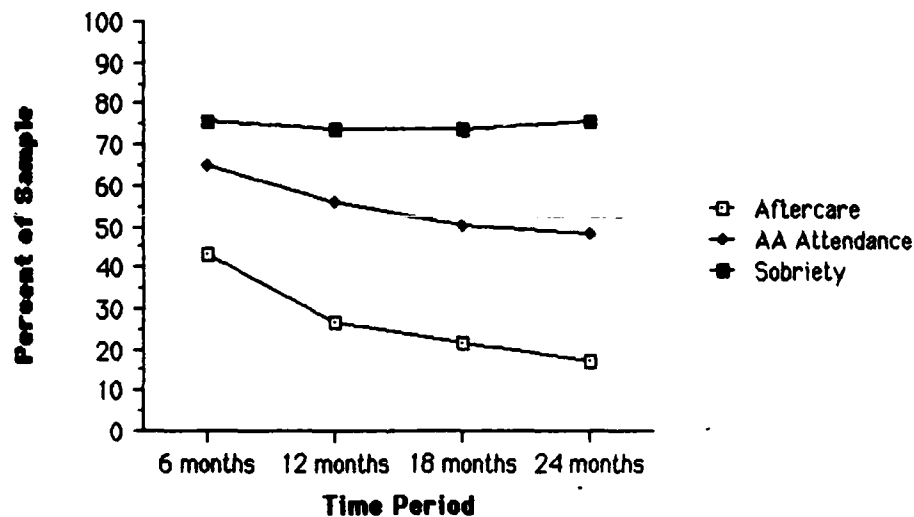
Critical value with 1 df: 0.01 = 6.64

discussion, attending aftercare resulted in only a smaller increase in sobriety rates (ranging from 6.3% to 13.4%) when compared with the subjects who did not attend aftercare.



Subjects who attended aftercare did not show the same degree of improvement over time as did the subjects who attended AA. Rather than the steady improvement observed in the AA subjects in Table 38, subjects attending aftercare tended to fluctuate through a relatively narrow range of

Table 41: AA Attendance, Aftercare, and Sobriety Rates



sobriety rates from 79.1% to 83.8% (see Table 39). Using the earlier established criteria for deciding whether a relationship existed, aftercare ceased to demonstrate a relationship with sobriety after the first year of follow-up.

As discussed in both the literature review and earlier in this chapter, there has been some indication that aftercare may interact with AA

attendance. Exploring this possibility, Table 40 looks at the relationship between sobriety and aftercare controlling for the effects of AA attendance. As can be seen from the relationship between the chi square tests and Phi statistics, once the effect of AA attendance was accounted for, the relationship between aftercare and sobriety was ambiguous at best.<sup>28</sup>

Looking at Table 40 it was clear that AA attendance was a more important influence on sobriety rates than was aftercare. For subjects who did not attend AA, the sobriety rates fluctuated considerably, suggesting a lack of stability in the maintenance of sobriety over time. In contrast, subjects who attended AA show the same steady improvement in their sobriety rates noted earlier in this chapter. Although not significant in terms of the measure of association, aftercare did provide an initial boost in the sobriety rates for AA attenders during the first year of follow-up. This initial difference, however, disappeared by the 18 month follow-up interview. In the second year of follow-up, for AA attenders there were no substantive differences in sobriety rates when comparing AA attenders who attended aftercare and those who did not attend aftercare.<sup>29</sup>

Table 41 combines data from earlier tables to look at the relationship between sobriety, AA attendance and aftercare attendance. In this study, subjects reported declining attendance for both AA and aftercare across the two year time period. It was interesting to note, however, that sobriety rates remained fairly constant cross the study and did not show a decrease

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<sup>28</sup> As discussed previously, given the large sample size, for a relationship to be considered significant, the  $X^2$  must be statistically significant  $\leq 0.01$  and  $\phi$  must be  $\geq 0.10$ .

<sup>29</sup> In fact, a close examination of the second year of follow-up for AA attenders suggests that subjects who attended aftercare, reported slightly lower sobriety rates than subjects who did not attend aftercare. Although the  $X^2$  was significant at 24 months, and the resulting  $\phi$  was very small.

in rates paralleling the decreases in the rates of AA attendance and aftercare attendance. While AA attendance, and aftercare, to some degree, were related to sobriety, there were other factors contributing to subjects' reports of sobriety which acted to sustain subjects' sobriety while their AA attendance and aftercare attendance decreased.

Table 42: Comparison of Sobriety  
by Aftercare and Intensity of Aftercare<sup>30</sup>

<u>Time Period</u>	<u>Aftercare</u>		<u>Intensity of Aftercare</u>	
	<u>Chi square</u>	<u>Phi</u>	<u>Chi square</u>	<u>Cramer's V</u>
06 months	34.95	0.110	13.99	0.069
12 months	53.26	0.135	5.31	0.042
18 months	9.94	0.059	3.65	0.035
24 months	18.40	0.080	1.94	0.026

(Critical value with 1 df: 0.01 = 6.64)                      (Critical value with 2 df: 0.01 = 9.21)

As discussed earlier, it became apparent early in the data analysis that the construct—"aftercare" was confounded with mental health treatment. In an effort to insure that the effect of aftercare was not being overlooked, an index was created which quantified aftercare by the types and amounts of aftercare services offered to subjects by selected treatment centers. The index was used to create a second aftercare

<sup>30</sup> The two aftercare variables were computed on different sample sizes. "Aftercare" was computed on the study sample (N = 2,950). "Intensity of aftercare", as a subset of the study sample was computed on an N = 2,059.

variable which was labelled "intensity of aftercare." The data from a subsample of treatment centers which participated in the creation of the index were reanalyzed, using a three-level (low-medium-high) intensity of aftercare variable. Table 42 shows that "intensity of aftercare" correlated with sobriety for only the first follow-up period and showed even less relationship with sobriety than did "aftercare." Aftercare, whether conceptualized as a dichotomous attendance variable, or three levels of intensity was, for the most part, unrelated to sobriety.<sup>31</sup>

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<sup>31</sup> As an example, in a multiple regression of sobriety at 12 months, the follow-up period for which "aftercare" produced the strongest measures of association, "intensity of aftercare", when entered into a multiple regression equation after the control variables, although statistically significant, resulted in a  $R^2$  change of only 0.003.

CROSS-LAGGED PANEL ANALYSES OF SOBRIETY  
BY THE TEST VARIABLES

Cross-lagged panel analysis of the relationship between sobriety and AA attendance suggested that the relationship was real, and was not simply the result of the spurious effect of an unknown third variable having been related independently to sobriety and AA attendance, and producing the appearance of a relationship where none existed. The interrelationships between the synchronous correlations, auto-correlations, and cross-lagged correlations supported the hypothesis that AA attendance influenced sobriety more than the reverse situation in which sobriety influenced AA attendance. No conclusions could be drawn about the cross-lagged panel analysis of the relationship between sobriety and aftercare due to the relatively weak and inconsistent correlations.

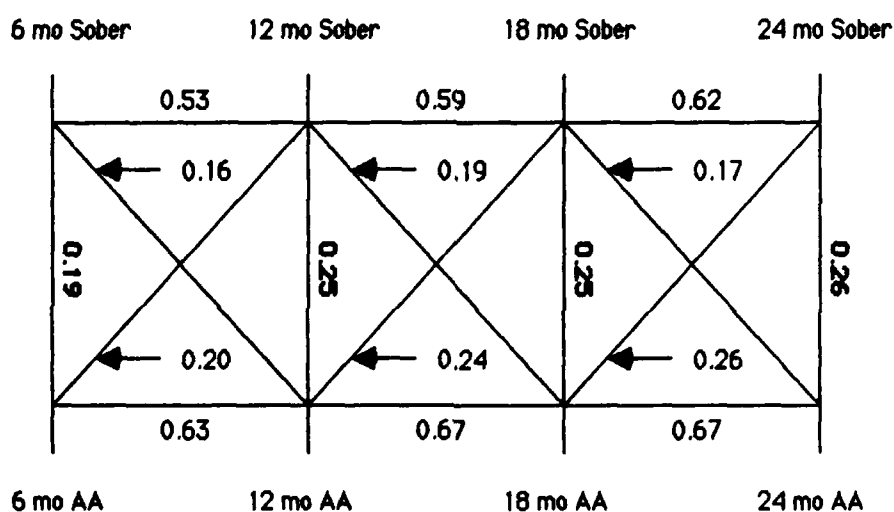
In the previous sections of this chapter, the relationship between sobriety and AA attendance has been demonstrated to be statistically significant, consistent over time, and accounting for a measurable degree of the variance in the dependent variable. The bivariate analyses between the test variables and sobriety have demonstrated covariation, i.e., that the two variables did not operate independently of each other. The causal issue, however, regarding the differential influence of one variable upon the other has yet to be addressed. Labelling, for the convenience of discussion, one variable independent and the other variable dependent does not attribute causal significance.<sup>32</sup>

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<sup>32</sup> As noted by Cook and Campbell (1979), "it does not matter whether the predictor works because it is a symptom or a cause" (p. 286)

In an effort to further our understanding of the correlative relationship between AA attendance and sobriety, cross-lagged panel analysis was used to explore the relationships between synchronous

Table 43: Cross-Lagged Panel Analysis of Sobriety by AA Attendance  
Across the Two Year Time Frame of the Study<sup>33</sup>



- (1) Time 1 (6- 12 months) z score: -2.07 (NS)
- (2) Time 2 (12- 18 months) z score: -2.28
- (3) Time 3 (18- 24 months) z score: -4.72

At  $\alpha = 0.01$ , the critical z score = -2.17

correlations, autocorrelations, and cross-lagged correlations generated by the two variables.<sup>34</sup> Through a discussion of the relationships among the

<sup>33</sup> As discussed in "Chapter Four: Methodology", the categories of both variables were collapsed into dichotomies and treated as metric variables for the purpose of the cross-lagged panel analysis.

<sup>34</sup> See Figure 3: "Diagram of Cross-Lagged Panel For Two Variables at Two Time Periods," (Chapter 4, p. 91) for a clarification of the relationships among the different types of correlations.

three types of correlations, it was possible to begin to draw inferences about The differential influence of one variable upon the other. This procedure allowed for comments about the apparent directionality of effect between the two variables, as well as rule out the possibility of the spurious influence of an unknown third variable.<sup>35</sup>

Cross-lagged panel analysis explicates relationships across time periods. Table 43 depicted the correlations between AA attendance and sobriety in the 6-month interval and compared them with correlations obtained in the 12-month interval. In like fashion, 12-month correlations were compared with 18-month correlations, and 18-month correlations with 24-month correlations.<sup>36</sup> The z-test, developed by Peters and VanVoorhis (1940), established whether the difference between the cross-lagged correlations was statistically significant, when the synchronous correlations and autocorrelations were taken into account.

The synchronous correlations between AA attendance and sobriety for each time period appeared to be stable, noting gradual increase in the size of the correlation from  $r = 0.19$  at 6 months to  $r = 0.26$  at 24 months. The autocorrelations between sobriety at one time period compared with the next adjacent time period demonstrated the same consistent increase in strength from  $r = 0.53$  at "time- 1" (6-12 month comparison) to  $r = 0.62$  at

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<sup>35</sup> Cross-lagged panel analysis is an extension of more general bivariate analytical techniques. Ruling out a spurious relationship between AA attendance and sobriety does not mean that other variables are not associated with sobriety. Ruling out a spurious relationship simply addresses the possibility of a third variable, independently related to both the predictor and outcome variable, giving the appearance of a relationship, when in fact, none exists. The relative strength of the relationship may still be weak, with other variables contributing to an explanation of the variance in the outcome variable.

<sup>36</sup> It is also possible to extend the cross-lag panel analysis by comparing correlations obtained at one follow-up interval with all other follow-up intervals. One could hypothesize that the farther apart the follow-up intervals were from each other, the weaker would be the resulting correlations.

"time- 3" (18-24 month comparison). In a similar fashion, the autocorrelations between AA attendance at one time period compared with the next adjacent time period demonstrated the same increase in strength from  $r = 0.66$  at "time- 1" (6- 12 month comparison) to  $r = 0.67$  at "time- 2" (12- 18 month comparison). The "time- 3" comparison is essentially unchanged.

The cross-lagged correlations revealed a consistent directional difference in the relationships between the first time period and the second time period being considered. In each of the three time period comparisons, the cross-lagged correlation in which AA attendance (from the previous time interval) was lagged behind sobriety (from the next time interval), was larger than the cross-lagged correlation in which sobriety (from the previous time interval) was lagged behind AA attendance (from the next interval).

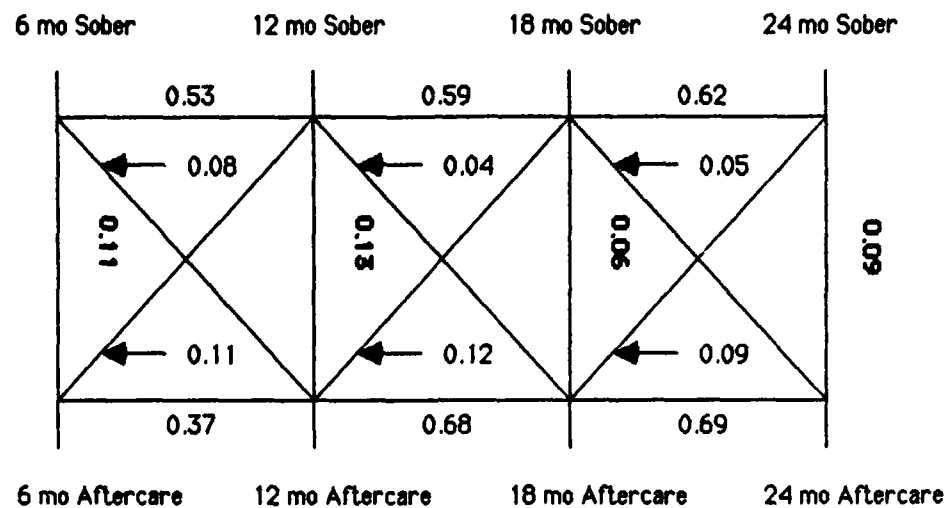
In each case AA attendance at "time- 1" would explain a larger proportion of the variance in subsequent sobriety at "time- 2", than the reverse situation in which sobriety at "time- 1" would explain subsequent AA attendance at "time- 2". This difference in directional strength of the cross-lagged correlations allowed for inferences about the relative influence of one variable upon the other. For this sample, the data suggested that the cross-lagged correlations for two of the three comparisons between time intervals were statistically significant. In the third comparison the difference in the cross-lagged correlations approached, but did not meet statistical significance.<sup>37</sup>

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<sup>37</sup> Obviously, these observations are only provisional in nature. Cross-lagged panel analysis can suggest hypotheses about relationships between variables. Confirmation of the findings would require replication in an experimental design.



Table 44: Cross-Lagged Panel Analysis of Sobriety by Aftercare Attendance Across the Two Year Time Frame of the Study<sup>38</sup>



- (1) Time 1 (6- 12 months) z score: -1.56 (NS)
- (2) Time 2 (12- 18 months) z score: -3.38
- (3) Time 3 (18- 24 months) z score: -1.99 (NS)

At  $\alpha = 0.01$ , the critical z score = -2.17

Given the relative stability among the three types of correlations it was possible to draw three conclusions. First, for two of the three comparisons it is possible to rule out the possibility of a spurious influence of a third and unknown variable creating the appearance of a relationship between AA attendance and sobriety. Second, the data suggested that AA attendance had a greater impact on subsequent sobriety in this sample, than

<sup>38</sup> As discussed in "Chapter Four: Methodology", the categories of both variables were collapsed into dichotomies and treated as metric variables for the purpose of the cross-lagged panel analysis.

the reverse situation in which established sobriety influenced subsequent AA attendance. Third, given the relatively small correlation coefficients, while suggestive of the influence of AA attendance upon subsequent sobriety, one must conclude that most of the variance in sobriety remained to be explained.

As might be expected from the earlier discussion of the relationship between sobriety and aftercare attendance, the picture presented by a cross-lagged analysis of sobriety by aftercare did not clarify the relationship between the two variables. The synchronous correlations in Table 44 show that a consistent relationship between sobriety and aftercare cannot be demonstrated past the 12-month follow-up interview. While all three comparisons were in the hypothesized direction, only one pair of cross-lagged correlations between 12-months and 18-months identified a statistically significant relationship. The autocorrelations for sobriety were relatively stable. In contrast, the autocorrelation ( $r = 0.37$ ) between 6-months and 12-months for aftercare suggested that something had occurred in the first six months which did not carry over to the remaining follow-up periods ( $r = 0.68$  and  $r = 0.69$ ).

Cross-lagged panel analysis of the relationship between sobriety and aftercare did not support the hypothesis that over the two year time frame of this study, attending aftercare would be of greater significance to sobriety than the reverse situation in which sobriety determined aftercare attendance. The significance of the comparison of the one pair of cross-lagged correlations (12 month-18 month) which resulted in significant z-test score, must be moderated by the small 18-month synchronous correlation ( $r = 0.06$ ). The statistically significant comparison between the

cross-lagged correlations was essentially irrelevant, as the comparison was bounded by a synchronous correlation between aftercare and sobriety which resulted in an  $r^2$  of 0.004.

Multivariate Analysis of Sobriety  
by Control Variables and Test Variables

From a pool of independent variables ( eight control variables and two test variables), for each follow-up period, SPSS stepwise multiple regression selected AA attendance as the variable best suited to explain the variance in sobriety. Aftercare was selected in a similar fashion for only the 6-month and 12-month follow-up period. In both instances, the additional explanatory power ( $R^2$  change) provided by aftercare was negligible.

In a separate multiple regression in which the control variables were entered as a block prior to consideration of the test variables, for each follow-up period AA attendance continued to be statistically significant and accounted for the majority of the explanatory power of the squared multiple correlation ( $R^2$ ). After taking into account both the control variables and AA attendance, aftercare was statistically significant for all follow-up periods. The additional increment of explanatory power provided by aftercare, over and above that already contributed by the other variables, was so small as to be meaningless.

The cross-validation of the multiple regression results suggested that the relationships among variables, described by the multiple regression, were, in fact, substantive rather than spurious. While AA attendance did account for a portion of the variance in sobriety, clearly the majority of the variance remained to be explained. Discriminant analysis of

sobriety indicated that knowledge of the independent variables improved probability of correctly predicting sobriety by 12.8%- 15.5 %.

Multiple regression is a "well established data analytic procedure" and has long been the "method of choice" for studying the relationship between one dependent variable and a group of two or more independent variables. (Bentler, et al., 1976, p. 161). This approach was used to examine the relationships among the independent variables to explore their relative contribution to an explanation of the variance in the dependent variable. The results of the multiple regression analysis were subsequently cross-validated to see whether the relationships identified in the development of the multiple regression equations would hold up when the equations were applied to a second sample.<sup>39</sup>

For each six-month follow-up interval, sobriety, as the dependent variable, was treated as an interval variable, ranging from 0- 6 months sobriety for each follow-up interval. The eight control variables previously identified, in combination with the two test variables (AA attendance and aftercare attendance), comprised the independent variables for the multiple regression analysis. Three variables (age, education, and number of times previously treated for chemical dependency) were treated as interval variables. Dummy coding was used to compare the three categories of type of substance abuse.<sup>40</sup> Marital status was collapsed into a dichotomous variable of "single" versus "together." Ethnicity was collapsed into a

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<sup>39</sup> As previously discussed, using a random numbers process, the study sample was divided into two subsamples. The multiple regression equations were developed on the first subsample and subsequently cross-validated on the second subsample.

<sup>40</sup> "ALCSA" contrasted "alcohol only" with "mixed drugs and alcohol." "ALCSB" contrasted "alcohol only" with "drugs only."

Table 45: Stepwise Regression of Sobriety with  
Eight Control Variables and Two Test Variables

Time Period

<u>Variable</u>	<u>R<sup>2</sup></u>	<u>Sig.</u>	<u>R<sup>2</sup> Change</u>	<u>Sig.</u>
<u>6 Month Follow-up</u>				
AA Attendance	0.056	.0000	----	----
Age	0.068	.0000	0.013	.0000
Prior Tx	0.082	.0000	0.014	.0000
Aftercare	0.087	.0000	0.005	.0065
Ethnicity	0.090	.0000	0.002	.0481
<u>12 Month Follow-up</u>				
AA attendance	0.097	.0000	----	----
Aftercare	0.104	.0000	0.007	.0012
Age	0.110	.0000	0.006	.0034
Employability	0.113	.0000	0.004	.0214
<u>18 Month Follow-up</u>				
AA attendance	0.073	.0000	----	----
Age	0.085	.0000	0.012	.0000
Prior Tx	0.092	.0000	0.006	.0023
Sex	0.096	.0000	0.005	.0099
Employability	0.099	.0000	0.003	.0328
<u>24 Month Follow-up</u>				
AA attendance	0.079	.0000	----	----
Age	0.089	.0000	0.009	.0002
Sex	0.093	.0000	0.004	.0147
Prior Tx	0.097	.0000	0.004	.0181

dichotomous variable of "white" versus "other." Employability and gender were treated as dichotomous variables, as were both test variables.

In the first step of the multiple regression analysis, all independent variables (both test variables and control variables) were entered into the regression equation in a stepwise fashion.<sup>41</sup> Stepwise regression was chosen to see what were the relationships among the independent variables and the dependent variable without designating the independent variables as either control variables or test variables. Each of the four follow-up intervals were treated separately. As can be seen in Table 45, the ordering and size of the resulting "R<sup>2</sup>" and "R<sup>2</sup> change" statistics, provided an indication of the relative contribution in the regression of sobriety of each of the independent variables.

The first independent variable selected by the SPSS subprogram "Regression" explained the "greatest amount of variance in the dependent variable" (Nie et al., 1975. p. 345). Table 45 shows that for each follow-up interval, in a stepwise fashion, AA attendance was selected as the most important independent variable in terms of its contribution to the explanation of the variance associated with sobriety. The "multiple R" ranged from 0.236 to 0.311 which explained from 5.5% to 9.7% of the variance in sobriety. All F-tests were significant beyond 0.0000.

Aftercare was selected in a stepwise fashion in only the first two follow-up intervals. In the 6-month follow-up interval, aftercare was the fourth variable selected. While the F-test associated with the inclusion of aftercare was statistically significant (0.0065), the "R<sup>2</sup> change" statistic

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<sup>41</sup> SPSS default parameters were used to establish stepwise inclusion criteria. See "Chapter Four: Methodology."

shows that the addition of aftercare to the regression equation only increased the explanation of the outcome variance by 0.5%. In the 12-month follow-up interval, while aftercare was chosen as the second variable to be entered into the regression equation, the "R<sup>2</sup> change" statistic showed that aftercare only added 0.7% to our understanding of the outcome variance. Aftercare was not selected for stepwise inclusion in either the 18-month follow-up interval or the 24-month follow-up interval.

Only four control variables were selected when SPSS subprogram "Regression" was allowed to choose freely from among the independent variables for inclusion on the basis of their relative contribution to the explanation of the variance of the dependent variable. Age was selected across all four time intervals, and was the second variable chosen in three of the four follow-up periods. Prior admission for chemical dependency treatment was selected for three time periods, while ethnicity, sex, and employability were each selected for two time periods.

Taking note of the associated "R<sup>2</sup> change", however, only age and prior admissions for chemical dependency treatment produced a measurable increase in the percent of explained variance in the 6-month follow-up interval. Age produced a measurable increase in the percent of explained variance in the 18-month follow-up interval. Otherwise the control variables were essentially irrelevant in terms of adding to the explanation of the variance in the dependent variable. Marital status, years of education, type of substance abuse were not selected by stepwise regression in any of the follow-up intervals.



Table 46: Multiple Regression of Sobriety with Test Variables Entered Individually After ALL Control Variables Were Entered as a Block<sup>42</sup>

Block Variables	<u>R2 change</u>			
	6 mo.	12 mo.	18 mo.	24 mo.
Control	0.032	0.018	0.024	0.021
+				
AA Attendance	0.054	0.091	0.070	0.075
+				
Aftercare	0.005	0.007	0.000	0.000
<hr/>				
Σ (Multiple R2)	0.091	0.116	0.094	0.096

Control Variables<sup>43</sup>

6 mo.	12 mo.	18 mo.	24 mo.
age	ethnicity	age	age
prior treatment	age	sex	sex
ethnicity	employability	employability	employability
employability	sex		

<sup>42</sup> The eight control variables were entered as a block. Within the block, the variables were entered in a stepwise fashion, using the SPSS default parameters as inclusion criteria. After all control variables had been entered, AA attendance was entered into the equation as a second block. Aftercare was entered as a third block if it met the inclusion criteria.

<sup>43</sup> Control variables listed in terms of their relative contribution to the explanation of the outcome variance. Within their block, the control variables were entered into the regression equation in a stepwise fashion.

While stepwise regression of the independent variables on sobriety provided one perspective about their relationships, a second perspective was obtained by entering all of the control variables as a block, prior to entering the test variables. This approach looked at the strength of the contribution of the test variables, vis-a-vis the control variables, in the explanation of the variance in sobriety. Could the influence of AA attendance and aftercare be demonstrated after the contribution of the control variables had been taken into account?

Table 46 shows that the control variables, when entered as a block, account for a very small percentage of the variance in sobriety. At the 6-month follow-up interview, the control variables explained only 3.4% of the variance in sobriety. By the 12-month interview, this percentage had dropped to 1.8%. In the second year of follow-up, the contribution of the control variables to the explanation of the variance in sobriety remained relatively stable, only declining from 2.4% to 2.1%. Age was the most important control variable in terms of its relative contribution to the explanation of the variance in the dependent variable.

Having previously taken the control variables into consideration, AA attendance explained the largest percent of the variance in sobriety. When compared with the control variables and aftercare, AA attendance accounts for the majority of the explained variance in sobriety, ranging from 59% at 6 months to 78% at 24 months. The percent of variance in sobriety accounted for by AA attendance increases between 6-months and 12-months and, to a lesser degree, between 18-months and 24-months.

After both the control variables and AA attendance were added to the regression equation, an attempt was made to add aftercare to the multiple

regression equation. As can be seen from Table 46, aftercare added only a negligible amount to the explanation of the variance in sobriety. Table 46 shows that while aftercare continued to be statistically significant at both 18 months and 24 months, and was entered into the multiple regression equation, its contribution to the explanation of the variance in sobriety was not measurable. In terms of substantial explanatory power, aftercare did not add to the explanation of the variance in sobriety once AA attendance and the control variables had been taken into consideration.

The multiple regression analyses described in Table 45 and Table 46 were developed on a subsample of 1435 subjects, selected in a random fashion from the larger study sample. One question that can be asked was whether these relationships represented substantive findings which might be expected to be observed in other samples, or were they spurious and

Table 47: Cross-validation of Multiple Regression.  
Entering the Test Variables Individually after the Control Variables  
Were Entered as a Block.

Follow-up Period	Multiple R	Cross-Validation r	Sig.
6 months	0.302	0.281	0.001
12 months	0.341	0.322	0.001
18 months	0.306	0.317	0.001
24 months	0.310	0.334	0.001

simply the combination of happenstance and a large sample size? To address these issues, a second and mutually exclusive subsample of 1515 subjects was selected in a random fashion from the study sample. Using the two subsamples, the multiple regression equations from the first sample were used to predict outcome scores for each subject in the second sample. The predicted outcome scores were then compared with the actual outcome scores by generating a Pearson  $r$ , calculated between the observed outcome scores and the predicted outcome scores for the second sample. As previously noted that the resulting Pearson  $r$  "was analogous to a multiple correlation" for the second sample, using the regression equations from the first sample (Pedhazur, 1982).

In Table 47, the multiple  $R$ s of the first (development) sample were compared with the Pearson  $r$ s from the second (cross-validation) sample. A perfect fit between the regression equations of the development sample and the data from the cross-validation sample was highly unlikely. The cross-validation  $r$  of the second sample is expected almost always to be smaller than the development multiple  $R$  from the first sample due to sampling error, etc. (Pedhazur, 1982, pp. 147- 148).

As can be seen in Table 47, this was true for the 6-month and 12-month time periods. It is interesting to note, however, that the "cross-validation  $r$ s" for both the 18-month and 24-month time periods were larger than the "development  $R$ s" with which they were compared. This increase was essentially meaningless and merely highlighted the effect of sampling error. Comparing the absolute differences between the multiple  $R$  and the Pearson  $r$ , it can be seen that shrinkage (or absolute difference) was relatively small. It was concluded that the multiple  $R$  between sobriety and

the independent variables (control and test ), while not indicative of a particularly strong relationship, did reflect the presence of a meaningful relationship which held up when compared with a second sample.

Taking the control variables into consideration, the multivariate analysis of the study data suggested that AA attendance was clearly related to sobriety across the two year follow-up period. In terms of the variables examined in this study, AA attendance was more important than all the other independent variables, taken together, in explaining the variance in sobriety. In contrast, the effect of aftercare, when all other independent variables had been accounted for, was very minimal during the first year of follow-up. No effect for aftercare could be demonstrated beyond the first year of follow-up. In terms of variance in sobriety, it must be noted that the majority of the variation remained to be explained.

The significance, as well as limitations of the model hypothesizing the relationships between the test variables and sobriety, can be further demonstrated through the use of discriminant analysis, a data analysis technique which combined the independent variables in such a fashion that the subjects could be divided into groups on the basis of their dependent variable scores. Discriminant analysis seeks to classify subjects into groups which were as statistically distinct on the dependent variable as possible (Nie, 1975, p. 435). The influence of a model which explained sobriety on the basis of control variables and the two test variables could then be determined by its ability to successfully predict subjects' sobriety.

Discriminant analysis was used to calculate a discriminant function which combined the eight control variables and two test variables to

predict sobriety outcomes.<sup>44,45</sup> Subjects received predicted outcome scores which divided them into two groups which were as distinct as possible. The predicted outcome scores were then compared with the actual outcomes to assess the effectiveness of the discriminant function to predict sobriety outcomes for the subsample on which the discriminant function was developed.<sup>46</sup>

Table 48: Percent of Successfully Predicted Sobriety  
Outcomes When Compared with Actual Outcomes.  
By Time Period

<u>Follow-up Period</u>	<u>Percent Correct Assignment</u>		
	Sober	Not Sober	Mean Sample
6 months	66.4	62.3	65.5
12 months	64.2	68.9	65.4
18 months	62.8	68.9	64.3
24 months	60.1	71.6	62.8

<sup>44</sup> The discriminant analysis was computed using SPSS subprogram "Discriminant Analysis". Variables were selected using the SPSS default settings. Control variables were entered first, in a stepwise fashion followed by the two test variables. Given the dichotomous nature of the dependent variable, only one discriminant function was computed.

<sup>45</sup> See Appendix F for the specific results of the discriminant analysis.

<sup>46</sup> The same subsample was used to develop the multiple regression equations and the discriminant function.

A model which predicted sobriety on the basis of the eight control variables and two test variables improved the ability to predict sobriety to a limited degree. If subjects' AA attendance, as the most potent of the independent variables, were unrelated to sobriety, an equal distribution of subjects between the sober and not sober categories would have been predicted. In Table 48 it can be seen that knowledge of the independent variables improved the predictive rate between 12.8% and 15.5%.

While AA attendance did account for a portion of the variance in sobriety, the majority of the variance remained to be explained. Other factors, not addressed in this study, appeared to have been an influence on subjects' sobriety outcomes. This was evident in the average predictive error rate which ranged from 34.4% to 37.2%. Knowledge about AA attendance, aftercare, and the control variables predicted "not sober" outcomes better than "sober" outcomes. The ability of the model to predict "not sober" outcomes improved over time, while the ability of the model to predict "sober" outcomes decreased over time. Clearly, there are other factors remaining to be identified which may have had an impact on the sobriety outcomes.

## CHAPTER SIX: DISCUSSION OF THE FINDINGS

### OVERVIEW

The results of the data analysis presented in the last chapter are discussed in this chapter. The chapter is divided into two sections. The first section discusses the results of the data analysis in light of the research questions and hypotheses developed in the third chapter. In the second part of the chapter, the limitations of this study are critiqued, both in terms of general secondary analysis issues and specific problems experienced with this research.

### RESPONSE TO THE RESEARCH QUESTIONS

**Question 1:** Was there a significant relationship between AA attendance and the control variables?

**Null Hypotheses:** For each time period, there was no relationship between attending AA and each of the eight control variables.



Table 49: Results of the Data Analysis in Terms of the  
Null Hypotheses Regarding the Relationship between  
AA Attendance and the Eight Control Variables

<u>No Relationship between</u> <u>AA Attendance and:</u>	<u>Null Hypothesis Rejected?</u>			
	<u>6 months</u>	<u>12 months</u>	<u>18 months</u>	<u>24 months</u>
1. Age	No	No	No	No
2. Gender	No	No	No	No
3. Marital Status	No	No	No	No
4. Ethnicity	No	No	?	No
5. Employability	No	No	No	No
6. Previous CD Tx	?	?	?	No
7. Type of Substance	No	No	No	No
8. Education	No	Yes	Yes	Yes

(No = unable to reject null hypothesis at  $\alpha = 0.01$ )

(? = equivocal-  $\alpha = 0.01$ , but  $\phi$  or Cramer's  $V < 0.10$ )

(Yes = able to reject null hypothesis at 0.01 and  $\phi$  or Cramer's  $V \geq 0.10$ )

There was little indication that there were any significant interactions between the eight control variables and AA attendance (see Table 49). For the majority of the expected relationships between AA attendance and the control variables, the null hypotheses could not be rejected. This outcome was in itself surprising as age and gender in particular were expected to have an impact on AA attendance. The absence of interaction between AA attendance and age and gender may have been due more to the population from which the sample was drawn than to factors inherent in the variables themselves. This finding did lend support to AA's contention that, as a self-help group, its resources are utilized by a broad spectrum of the U.S. population (AA World Services, 1984).

As previously suggested, a distinctive characteristic of this sample, when compared with other samples reported in the literature, is that it was not selected from the more typically studied population of indigent middle-aged males treated in public institutions. As alcoholism treatment becomes a more acceptable resource for larger sections of the U.S. population, their presence will be reflected in the outcome results. As alcohol treatment moves beyond the treatment of chronic inebriates, other demographic features will be represented more frequently in the research literature.

Due primarily to the socioeconomic characteristics of AA membership in its formative years, a public conception about AA developed that it was a support group for those "who had lost their jobs, hit Skid Row, and had completely disrupted their family life and social relationships" (Robinson, 1979, p. 29).<sup>1</sup> Years of education was included in this study because it was one of the few CATOR-III items which provided a rough indicator of socioeconomic status of the subjects in this sample. In general, more education has been associated with stable employment and higher paying jobs.<sup>2</sup>

In the literature, the relationship between socioeconomic status and AA attendance was ambiguous. Knight et al. (1980) hypothesized that self-help groups tended to be utilized by a working class population, while upper-middle class, well educated persons tended to seek out more conventional modes of therapy (p. 60). Vaillant (1983), on the other hand,

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<sup>1</sup> Clinebell (1968), in writing one of the first treatment manuals for alcoholics wrote, in the early 1950s that "a high proportion of AA members were considered hopeless by their family, friends, doctors and clergymen" (p. 119). "The low-bottom alcoholic provided the stereotype of what all alcoholics were supposed to be like" (p. 26).

<sup>2</sup> For detailed discussion see the discussion of socioeconomic status indicators in Polich et al., 1980 & 1981).

found no differences in AA attendance between his college educated subsample and an inner city working class comparison sample (p. 207). Poley et al. (1979) reported that AA membership draws from the "lower-middle to upper-middle socioeconomic levels" (p. 48).

Beginning with the 12-month follow-up interview, years of education was the one control variable which was significantly related to AA attendance in three of four follow-up intervals. Subjects with more than 12 years of education had somewhat higher AA attendance rates, which ranged from 68.1% at 6 months to 52.2% at 24 months. Subjects with 12 years of education or less reported somewhat lower AA attendance rates which ranged from 61.5% at 6 months to 45.7% at 24 months (see Table 29).

Approximately 6.6% more subjects in this sample with at least high school education attended AA than did subjects with less than a high school education. This difference in AA attendance rates was constant for the years of education across the two year follow-up period. For this sample, in terms of the years of education, the data supported a hypothesis that AA attendance was at least as attractive to middle class subjects as it was to working class subjects. In fact, subjects who reported at least a college education (> 16 years of education) had AA attendance rates which ranged from 70.7% at 6 months to 57.2% at 24 months.

Table 27 shows that subjects who had been previously admitted for chemical dependency treatment reported that they were slightly more likely to attend AA. This finding, while statistically significant for the first three follow-up periods, resulted in such small measures of association as

to have very little interpretive meaning.<sup>3</sup> Other than education and previous treatment, little difference was found between subjects who attended AA and those who did not attend AA. In terms of the subjects' use of AA, this absence of significant relationships between AA attendance and the control variables was a positive, if unexpected, outcome.

**Question 2: Was there a significant relationship between aftercare attendance and the control variables?**

**Null Hypotheses: For each time period, there was no relationship between attending aftercare and each of the eight control variables.**

The same general pattern identified above regarding the relationship between AA attendance and the control variables was evident in the relationship between aftercare attendance and the control variables (see Table 50). The majority of the null hypotheses could not be rejected. The interaction between aftercare and the control variables tended to involve different variables from those interacting with AA attendance. The majority of the relationships were rather weak, with only gender, type of substance, and years of education resulting in a measure of association of any size. The interaction between aftercare and both employability and

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<sup>3</sup> This finding, however, neatly fits with the AA adage that "if you aren't ready to stop drinking, go out and drink some more...you'll be back."

marital status was statistically significant but did not yield relevant measures of association.<sup>4</sup>

Table 50: Results of the Data Analysis in Terms of the  
Null Hypotheses Regarding the Relationship between  
Aftercare Attendance and the Eight Control Variables

<u>No Relationship between Aftercare Attendance and:</u>	<u>Null Hypothesis Rejected?</u>			
	<u>6 months</u>	<u>12 months</u>	<u>18 months</u>	<u>24 months</u>
1. Age	No	No	No	No
2. Gender	Yes	Yes	Yes	Yes
3. Marital Status	?	No	No	No
4. Ethnicity	No	No	?	No
5. Employability	?	No	No	No
6. Previous CD Tx	No	No	No	No
7. Type of Substance	?	?	?	Yes
8. Education	No	No	Yes	Yes

(No = unable to reject null hypothesis at  $\alpha = 0.01$ )

(? = equivocal -  $\alpha = 0.01$ , but  $\phi$  or Cramer's  $V < 0.10$ )

(Yes = able to reject null hypothesis at 0.01 and  $\phi$  or Cramer's  $V \geq 0.10$ )

Females consistently had a higher rate of aftercare attendance than did the males. Females reported aftercare attendance rates which ranged from 47.8% at 6 months to 23.2% at 24 months, while males reported aftercare attendance rates which ranged from 41.1% at 6 months to 14.8% at

<sup>4</sup> As was noted in the narrative accompanying the graphs in the fourth chapter, the measures of association between the control variables and aftercare were more affected by whether clients attended aftercare than their classification on the particular control variables. The measures of association, in themselves, were relatively small.

24 months (see Table 26). The gender differences slightly increased over the two year period, from 6.8% more females than males attending aftercare at 6 months to 8.4% more females than males attending aftercare at 24 months. The differences across the gender categories were small when compared to differences across the categories of aftercare attendance. Regardless of gender, the majority of the subjects never attended aftercare.

Gender differences in terms of treatment utilization are well known (Schuckit, 1985, p. 104). Compared with males, females have higher utilization rates of outpatient services.<sup>5</sup> As noted above, it might be hypothesized that, as treatment for alcoholism becomes more accepted in the mainstream population, the utilization of chemical dependency aftercare services will increasingly resemble the utilization rates of other types of health care services. Parenthetically it was noted that although not reaching the level of statistical significance, the AA attendance data also showed a similar pattern. At each follow-up interview, more females than males reported attending AA (see Table 27).<sup>6</sup>

The relationship between type of substance and aftercare was statistically significant across the time frame of the study, but yielded only small measures of association. Table 28 shows that the relatively small group of "drug abuse only" subjects (N = 201) reported higher rates of aftercare attendance than either the "alcohol only" group or the "alcohol mixed with drugs" group. Schuckit (1979) reported that drug abusers are often under legal mandate to attend aftercare programs, while Westermeyer

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<sup>5</sup> In contrast, males have higher utilization of inpatient services than females. (Kincannon, 1987, in a classroom discussion, Public Health 5047: Intervention/Secondary Prevention of Drug Abuse In Adults, Spring Quarter, 1987). Overall, males have much lower medical care utilization rates than females. (Jones and Vischi, 1979, p. 13).

<sup>6</sup> Alford (1980) also found that more females than males attended AA meetings (p. 366).

(1986) noted that drugs used in the treatment of opiate addiction are available only through licensed clinics. Both points suggested that there may have been "external agents" serving to motivate higher levels of aftercare attendance for the "drug abuse only" group.

The statistical relationship between years of education and aftercare attendance was not easily explained (see Table 30). Several hypotheses suggest themselves as possible explanations for this finding. First, subjects with higher levels of education were possibly better disciplined and motivationally more inclined to remain in treatment. Second, as previously discussed, it has been hypothesized that upper-middle class, well-educated persons tend to utilize mental health services rather than self-help groups.<sup>7</sup> It may well have been that the subjects with more years of education were not attending aftercare at the 18-month and 24-month follow-up interviews, but were involved in some type of long-term mental health counseling. Given the limitations previously discussed with the primary data source, it was not possible to explore this area in more detail.<sup>8</sup>

For the sake of discussion, if it is assumed that most subjects, upon completion of their inpatient chemical dependency treatment, were referred to both AA and aftercare services, what was occurring to create the differential impact of the control variables on the test variables? Only education was positively correlated with both test variables. Although relatively weak correlations, these findings suggest that different dynamics may be operating in terms of AA attendance and aftercare

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<sup>7</sup> See earlier cite for Knight et al. (1980, p. 60)

<sup>8</sup> As previously discussed, aftercare was confounded with mental health treatment in the wording of the CATOR-III item.

attendance. While puzzling, this differential impact of the control variables upon the test variables, does indirectly suggest that, in contrast to what will be presented below, attending aftercare may yet play a role, albeit small, in determining outcome.

**Question 3:** Were there significant relationships between the control variables and the one outcome variable (sobriety) for which a significant relationship with the test variables was demonstrated?

**Null Hypotheses:** For each time period, there were no relationships between sobriety and each of the eight control variables.

Table 51 shows that it was possible to reject a number of the null hypotheses as there was substantially more interaction between the control variables and sobriety than between the control variables and either of the test variables. As can be observed in Tables 34 through Table 37, the interaction between sobriety and the control variables, was, for the most part, fairly constant across the two year time span of this study. With the exception of the relationship between sobriety and age, the measures of association between sobriety and the remaining control variables tended to be small.



Table 51: Results of the Data Analysis in Terms of the  
Null Hypotheses Regarding the Relationship between  
Sobriety and the Eight Control Variables

<u>No Relationship between Sobriety and:</u>	<u>Null Hypothesis Rejected?</u>			
	<u>6 months</u>	<u>12 months</u>	<u>18 months</u>	<u>24 months</u>
1. Age	Yes	Yes	Yes	Yes
2. Gender	No	No	?	No
3. Marital Status	Yes	?	Yes	Yes
4. Ethnicity	No	No	No	No
5. Employability	No	No	No	No
6. Previous CD Tx	Yes	Yes	Yes	No
7. Type of Substance	Yes	?	Yes	?
8. Education	No	Yes	No	No

(No = unable to reject null hypothesis at  $\alpha = 0.01$ )

(? = equivocal-  $\alpha = 0.01$ , but  $\phi$  or Cramer's  $V < 0.10$ )

(Yes = able to reject null hypothesis at 0.01 and  $\phi$  or Cramer's  $V \geq 0.10$ )

The strongest relationship between sobriety and the control variables observed in this study was with age. Table 34 shows that at 6 months, 67.1% of the "under 30" subjects were sober as compared with 80.1% of the subjects "over 30." This pattern was fairly constant across the study so that at 24 months, 68.8% of the "under 30" subjects were sober as compared with 78.7% of the "over 30" subjects. These findings are consistent with the literature in which age and sobriety have been shown to be significantly related. Younger subjects have more difficulty remaining chemically free than do older subjects (Mendelson and Mello, 1979; Schuckit, 1985; and Bowen, 1987).

Previous admissions for chemical dependency treatment were significantly related to sobriety, although Table 35 shows that the majority of the relationship was more concerned with the choice of sobriety categories than the number of previous admissions. The impact of previous admissions on the subjects' reports of sobriety was not as large in this study as was anticipated from other reports in the literature.<sup>9</sup> At six months, 78% of the subjects who reported no previous admissions were sober compared with 71.5% of the clients who had been previously admitted. By 24 months the percent of sober subjects who reported no previous admissions had declined slightly to 76.9%, while the percent of sober subjects who had previous admissions actually increased to 73.1%.

Marital status was significantly related to sobriety across the two year follow-up period. Table 37 shows that subjects who reported their marital status as single were less likely to report successfully remaining abstinent. For the remainder of the subjects, whether they were married, divorced, separated, or widowed did not make an appreciable difference. Although not addressed in the data analysis, it was likely that the quality of "singleness" in relationships also interacted substantially with age and type of substance. Young, single, subjects who reported drug abuse would likely have had a substantially less optimistic prognosis.<sup>10</sup> Gibbs and Flanagan

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<sup>9</sup> Kolb et al. (1978), Ornstein and Cherepon (1985), Schuckit, et al. (1986) all found the number of previous hospitalizations for alcohol problems to be a significant predictor of outcome functioning.

<sup>10</sup> Interaction among the control variables was not addressed in this design, as the control variables were not the direct subject of inquiry. When age was entered into the multiple regression equations, marital status and type of substance were excluded, which supported the hypothesis about the possibility of significant interaction among age, type of substance and marital status. An alternative research strategy could have explored the relationships between these variables and sobriety using analysis of covariance, controlling for age, etc.

(1977) noted that nine of the ten studies which looked at marital status found it to be a predictor of successful outcome (p. 1131).

Type of substance, gender, and previous admission for chemical dependency treatment weakly interacted with both the test variables and sobriety, as an outcome variable. Age and marital status were correlated only with sobriety, while education, for the most part, was correlated only with the test variables. Overall, the effect of the control variables upon either the test variables or the outcome variable was minimal.

One conclusion that can be drawn from these findings is that, for the subjects involved in this sample, either the test variables and outcome variable operated fairly independently from other mediating factors, or, as suspected by the author, there were other, more significant mediating variables involved with this sample which were not addressed by the literature and not identified in this study.

**Question 4: Was there a significant relationship between AA attendance and the outcome variables?**

**Null Hypotheses:** For each time period, there was no relationship between attending AA and each of the eleven outcome variables.

Table 52: Results of the Data Analysis in Terms of the Null Hypotheses Regarding the Relationship between AA Attendance and the Eleven Outcome Variables

No Relationship between AA Attendance and:	<u>Null Hypothesis Rejected?</u>			
	<u>6 months</u>	<u>12 months</u>	<u>18 months</u>	<u>24 months</u>
1. Full-time Employment	No	No	No	No
2. Part-time Employment	No	No	No	No
3. Welfare Assistance	No	No	No	No
4. Disability Assistance	No	No	No	No
5. Hospitalized- Medical	No	No	No	No
6. ER Visits	No	No	No	No
7. Injuries	No	?	No	No
8. Hospitalized- Emotional	No	No	No	No
9. Misdemeanors	No	No	No	No
10. Felonies	No	No	No	No
11. Sobriety	Yes	Yes	Yes	Yes

(No = unable to reject null hypothesis at  $\alpha = 0.01$ )

(? = equivocal-  $\alpha = 0.01$ , but  $R^2 < 0.01$ )

(Yes = able to reject null hypothesis at 0.01 and  $R^2 \geq 0.01$ )

As can be seen in Table 52, for ten of the eleven outcome variables the null hypotheses of no relationship with AA attendance could not be rejected. Only sobriety produced a statistically significant relationship with AA attendance. Certainly AA makes no promises to their membership beyond helping alcoholics to stop drinking.<sup>11</sup> However, the absence of significant relationships between AA attendance and most of the outcome variables should not be misconstrued to mean that attending AA should be relegated to a catch-all for ineffective efforts.

The apparent absence of a relationship between AA attendance and the outcome variables can be addressed on two levels. First, there were contextual issues which serve to minimize the possibility of finding a relationship between AA attendance and the outcome variables. Second, and more important, the absence of a relationship between AA attendance and the majority of the outcome variables calls into question the adequacy of the model which generated this study. A discussion of the adequacy of the model will be deferred until later in this chapter. As a question for further study, an alternative research hypothesis suggested by these results will be presented in the next chapter.

The absence of a significant relationship between the employment variables and AA attendance may well be a function of sample selection. As has been previously discussed, the study sample was composed of a group of relatively high functioning subjects. Table 5 shows that only 14% of the sample described themselves as unemployed at the time of admission to treatment. Consequently, looking for a relationship between AA attendance

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<sup>11</sup> It is interesting to note that AA's charter does not promise to improve employment status, marital functioning or health, etc. AA's agenda focuses entirely on behaviors, feelings and attitudes as they relate to supporting the clients' desires to not drink.

and employment as an outcome measure when the majority of subjects are already employed, would not produce significant results unless there was a dramatic improvement in the unemployed category vis-a-vis the employed category<sup>12</sup>

One of the benefits associated with inpatient treatment for alcoholism is the reduction in health care costs following treatment (Jones and Vischi, 1979). Current medical and psychological problems are stabilized if not resolved, and future problems are postponed, if not prevented. Consequently, even under the most adverse situations, at the group level, a substantial amount of time would have to pass before changes in the group's health status would begin to occur. For this reason the time frame of the study may have been too short to document an effect between AA attendance and the development or reduction of further health problems.

The final methodological explanation for the absence of an observed relationship between AA attendance and the outcome variables may have been related to the relative infrequency with which a number of the outcome events occurred. For example, among the 2950 subjects at 6 months, there were only 49 reports of misdemeanors, and 4 reports of felonies related to chemical use. The numbers of events was so small, that a much larger sample would have been necessary to adequately explicate the relationship between AA attendance and these relatively rare events.<sup>13</sup>

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<sup>12</sup> An alternative approach to looking at employment as an outcome variable, would have been to attempt to look at changes in employment status over time and their relationship to AA attendance. Changes in employment status might have functioned as a more sensitive measure of employment.

<sup>13</sup> The relationship between legal problems and AA attendance is often complex. In many instances subjects arrested for alcohol related offenses will go to AA in an attempt to influence legal outcomes, or may be directed to AA as part of a mandated rehabilitation regimen (Moore and Gerstein, 1981; Cahalan, 1987).

Table 38 shows that for this sample, there was a strong relationship between AA attendance and sobriety which was clearly demonstrated across the two year time frame of this study. Subjects who attended AA either several times a month or weekly exhibited sobriety rates that ranged from 16.7% to 22.4% higher than the subjects who did not attend AA or only attended AA on a sporadic basis. Furthermore, the graph shows that subjects who attended AA experienced steady improvement in their sobriety rates over the two years' follow-up.

Subjects who did not attend AA experienced an initial decline in their sobriety rates between 6-months and 12-months.<sup>14</sup> It is interesting to note, however, that in the second year of follow-up that both the AA attenders and the non-attenders experienced improvement in their sobriety rates. The slopes of both lines are equivalent. While both groups were maintaining steady improvement in their sobriety rates, there were substantial changes in the size of the groups within their respective categories. The number of non-attenders were increasing from 35.4% of the at 6 months to 51.8% of the sample at 24 months, while the number of AA attenders decreased from 64.6% of the sample at 6 months to 48.2% of the sample at 24 months.

This point is further underscored in Table 41 which shows that in this sample, while the sobriety rate remained relatively constant (ranging from 74.0% to 75.9% ) over the two year period, AA attendance decreased in each of the follow-up periods. These findings would suggest that while AA attendance is related to sobriety, there are other factors which influenced

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<sup>14</sup> Kruzich (1980) noted that the majority of treatment failures occur within the first months following discharge from treatment.

sobriety. As will be discussed in more detail, the other factors influencing sobriety for this sample remain for the most part unknown to date.<sup>15</sup>

**Question 5: Was there a relationship between aftercare attendance and the outcome variables?**

**Null Hypotheses: For each time period, there was no relationship between attending aftercare and each of the eleven outcome variables.**

Table 53 shows that, as in the case of AA attendance, there was little indication, with the obvious exception of sobriety, that aftercare was related to any of the remaining outcome measures. In general, the earlier discussion regarding the absence of substantial relationships between the control variables and AA attendance is applicable to a discussion of aftercare and, in the interests of controlling redundancy will not be repeated here.

What was interesting to note was that, unlike AA attendance, aftercare had a number of very small, but statistically significant correlations with outcome variables. Part-time employment, welfare assistance, and hospitalization for emotional problems were positively correlated with aftercare at one or more time intervals (see Table 32).

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<sup>15</sup> Cronkite and Moos (1980) suspect that posttreatment experiences such as "family environment, stressful life events, and coping responses may explain 70- 90% of the variance in treatment outcome" (p. 305).



Their measures of the magnitude of association, however, were so small as to make these correlations meaningless.

Table 53: Results of the Data Analysis in Terms of the  
Null Hypotheses Regarding the Relationship between  
Aftercare Attendance and the Eleven Outcome Variables

<u>No Relationship between Aftercare Attendance and:</u>	<u>Null Hypothesis Rejected?</u>			
	<u>6 months</u>	<u>12 months</u>	<u>18 months</u>	<u>24 months</u>
1. Full-time Employment	No	No	No	No
2. Part-time Employment	?	No	?	No
3. Welfare Assistance	No	No	?	No
4. Disability Assistance	No	No	No	No
5. Hospitalized- Medical	No	No	No	No
6. ER Visits	No	No	No	No
7. Injuries	No	No	No	No
8. Hospitalized- Emotional	No	No	No	?
9. Misdemeanors	No	No	No	No
10. Felonies	No	No	No	No
11. Sobriety	Yes	Yes	?	?

(No = unable to reject null hypothesis at  $\alpha = 0.01$ )

(? = equivocal-  $\alpha = 0.01$ , but  $R^2 < 0.01$ )

(Yes = able to reject null hypothesis at 0.01 and  $R^2 \geq 0.01$ )

Comparing Tables 31 with Table 32, the difference in the overall pattern of relationships between the respective test variables and the outcome variables was striking. With the exception of sobriety, AA attendance was clearly unrelated to the outcome variables. Aftercare, on

the other hand, appeared to be slightly related to a number of the outcome variables, although the relationships were admittedly very weak. One possible explanation for this difference would be to suggest that aftercare, rather than being a total duplication of AA efforts, might be addressing issues other than sobriety which have more of a direct impact on outcome.

Tables 19 and Table 20 show that the percent of the sample attending aftercare markedly decreased from 43.1% of the sample at 6 months to 26.8% at 12 months. In the second year of follow-up the pattern continued so that by 24 months only 17.2% of the sample were attending aftercare. The relationship between AA and aftercare becomes evident when it was noted that 80.5% of the subjects attending aftercare at 6 months were also attending AA, compared to 73.8 percent at 24 months. Aftercare markedly reinforces AA attendance, so much so that only 8.3% of the sample attended aftercare only, which decreased to 4.5% at 24 months.

What is important to note was that a clear majority of subjects (ranging from 56.9% at 6 months to 82.8% at 24 months) did not attend aftercare. When they did attend, it was for short periods of time, clustered around the point of discharge from inpatient treatment.<sup>16</sup> In noticeable contrast, the interviews conducted with the aftercare coordinators suggested that their expectations were that it would be beneficial for the subjects to attend aftercare through at least through the first year, and in several instances through the second year.<sup>17</sup>

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<sup>16</sup> Ossip-Klein et al. (1984) also noted the high attrition rate among aftercare participants (p. 85).

<sup>17</sup> On the other hand, an alternative argument can be made that as short-term transition programs, established for sole purpose of returning the client to his community, attendance in aftercare programs should be short term, so that one would not expect to see significant numbers of subjects attending aftercare beyond the first six- twelve months posthospitalization.

Table 39 shows the relationship between aftercare and sobriety. On the surface it would appear that, although not as stable as AA attendance, aftercare attendance resulted in an increase in the sobriety rates when compared with subjects who did not attend aftercare. Examining the measures of association ( $\phi$ ) it was clear that the effect of aftercare on sobriety was small during the first year and ceased to be significant in the second year.<sup>18</sup> In the second year aftercare accounted for only an inconsequential amount (ranging from 0.3% at 18 months to 0.6% at 24 months) of the variance in sobriety.

As previously discussed, interviews were conducted with 15 coordinators of aftercare programs in an effort to improve the validity of aftercare as a construct. All coordinators interviewed indicated their programs reinforced subjects attending AA. Consequently it was expected that there would be a substantial amount of interaction between aftercare and AA attendance. Table 40 considered the possible interaction by looking at the relationship between aftercare and sobriety controlling for the effect of AA attendance.

The measure of the magnitude of association between aftercare and sobriety, taking into account AA attendance, was so small as to make interpretation of the relationship meaningless. Aftercare did not account for at least one percent of the variance in sobriety when the effect of AA attendance was controlled. For subjects who attended AA there were no consistent patterns in their aftercare attendance across the two years. For subjects who did not attend AA, their aftercare attendance was

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<sup>18</sup> See earlier discussion regarding decision rules to reduce the possibility of accepting a spurious relationship as real by setting the  $\alpha = 0.01$  and the  $r^2 (\phi^2) = 0.01$ .

statistically significant during the first year but accounted for less than one percent of the variance in sobriety.

As discussed earlier, aftercare as a construct was compromised in terms of content validity. Efforts to improve the construct by creating a measure of intensity of aftercare did not result in substantially different results (see Table 42). Both predictor variables ("aftercare attendance" and "intensity of aftercare") resulted in significant chi square tests in the first follow-up period. In both instances, the measures of association were very small and inconsequential, even when the relationships were statistically significant.

Regardless of which construct was used, the effect of aftercare did not extend beyond the first year and explained such a small portion of the variance in sobriety, that the statistical relationship had no meaning. These findings were consistent with Ahles et al. (1983) who also found a small correlation between aftercare and abstinence. "Analyses which looked at aftercare and areas other than abstinence failed to reach an acceptable level of significance" (p. 57). In contrast to Walker et al. (1983) the higher intensity of aftercare was not correlated with improved outcome functioning.

**Question 6:** Does cross-lagged panel analysis enhance our understanding of the correlations between the test variables and sobriety?

**Null Hypotheses:** For each comparison of time periods (6-months with 12-months, etc), there were no differences between the two cross-lagged

correlations, connecting the test variables with sobriety.

**Null Hypotheses:** For each comparison of time periods (6-months with 12-months, etc), the synchronous correlation between the test variables and sobriety was spurious, due to the independent influence of a third (unknown) variable.

Table 54: Results of the Data Analysis in Terms of the Null Hypotheses Regarding the Cross-Lagged Panel Analyses of The Test Variables and Sobriety

<u>Null Hypothesis:</u>	<u>Null Hypothesis Rejected?</u>		
	<u>6 mo-12 mo</u>	<u>12 mo-18 mo</u>	<u>18 mo-24 mo</u>
<u>AA Attendance and sobriety:</u>			
1. Spurious Relationship?	No	Yes	Yes
2. Cross-Lag Correlations Equivalent?	No	Yes	Yes
<u>Aftercare and sobriety:</u>			
1. Spurious Relationship?	No	?	No
2. Cross-Lag Correlations Equivalent?	No	?	No

(No = unable to reject null hypothesis at  $\alpha = 0.01$ )

(? = equivocal-  $\alpha = 0.01$ , but  $R^2 < 0.01$ )

(Yes = able to reject null hypothesis at 0.01 and  $R^2 \geq 0.01$ )

The cross-lagged panel analysis between AA attendance and sobriety (Table 54) supported for the most part the hypotheses that the relationships between AA attendance and sobriety were real rather than spurious, and suggested that the diagonal relationships (AA at time 1 by sobriety at time 2, etc.) of AA attendance contributing to sobriety were more relevant than the reverse situation. The results of the cross-lagged panel analysis between aftercare and sobriety were inconclusive. The effects of a third variable causing the appearance of a spurious relationship could not be ruled out. The comparisons of the diagonal relationships were not significant.

The relationships in Table 43 between AA attendance and sobriety were consistent across time and stable, in that there was little change in the size of correlations from one time period to the next. The relatively small size of the synchronous correlations and cross-lagged correlations, suggested caution regarding any inference about relationships between the variables. As has previously been discussed, other factors, although unknown, apparently contributed to the variance in sobriety. Consequently, even though the cross-lagged panel analysis of the relationship between AA attendance and sobriety was statistically significant, the other unknown factors may have been more instrumental in influencing sober outcomes.

Closer examination of the cross-lagged correlations suggested that, although two of the three comparisons between time periods were statistically significant, the influence of sobriety on subsequent AA attendance was not ruled out. The data suggested that while AA attendance was more of an influence on sobriety than the reverse situation, the data suggested sobriety may also have influenced subsequent AA attendance. In other words, while cross-lagged panel analysis ruled out the possibility of a

spurious relationship between the two variables, the relatively small difference in size between the cross-lagged correlations in each time period suggested that both variables influenced each other, but that the influence of AA attendance on sobriety is slightly stronger than the reverse situation.

Although essentially producing negative results, the cross-lagged panel analysis between aftercare and sobriety was more interesting in terms of outcome (see Table 44). As noted above, only one of the three comparisons between time periods (12-18 months) was statistically significant. As the cross-lagged correlation between 12-months and 18-months resulted in an 18-month synchronous correlation which was essentially meaningless (the predictor variable only explained 0.4% of the variance in the outcome variable). For practical purposes, it was concluded that the cross-lagged panel analysis did not demonstrate a relationship between aftercare and sobriety.

Thus cross-lagged panel analysis was not able to rule out the possibility that the apparent relationship between aftercare and sobriety may have been spurious, the result of the influence of a third variable on both aftercare and sobriety. Given the previously discussed contribution of AA attendance vis-a-vis aftercare to sobriety, we have some idea what that third variable may have been. For this sample, the data cannot rule out a hypothesis that the relationship between aftercare and sobriety may be the spurious result of the relationship between AA attendance and sobriety and AA attendance and aftercare.

**Question 7:** Do the test variables improve our understanding of the variance in sobriety over and above the variance already explained by the control variables?

**Null Hypotheses:** For each time period, AA attendance did not add to the understanding of the variance in the outcome variables when the control variables were entered first into a multiple regression equation.

**Null Hypotheses:** For each time period, aftercare attendance did not add to the understanding of the variance in the outcome variables when the control variables and AA attendance were entered first into a multiple regression equation.

Table 55 reveals that, while the null hypotheses regarding AA attendance can be easily rejected, the same cannot be said about rejecting the null hypotheses regarding aftercare attendance. Both methods (stepwise and block entry ) of entering the test variables into the multiple regression equation resulted in, at best, ambiguous results about the relationship *between aftercare attendance and sobriety.*

Table 45 shows that in a stepwise multiple regression of sobriety in which the eight control variables and two test variables were entered on the basis of the importance of their contribution to the explanation of the variance in the outcome variable, AA attendance was chosen in each follow-



up period as the most important of the variables considered in this study. Across the two year time frame of this study, AA attendance accounted for only a small portion (ranging from 5.6% to 9.7%) of the variance in sobriety.

Table 55: Results of the Data Analysis in Terms of the Null Hypotheses Regarding the Multiple Regression Analyses of the Test Variables and Sobriety

<u>Null Hypothesis:</u>	<u>Null Hypothesis Rejected?</u>			
	<u>6 months</u>	<u>12 months</u>	<u>18 months</u>	<u>24 months</u>
1. AA attendance did not add to the explanation of the variance in sobriety already provided by the control variables?	Yes	Yes	Yes	Yes
2. Aftercare attendance did not add to the explanation of the variance in sobriety already provided by the control variables and AA attendance?	?	?	?	?

(No = unable to reject null hypothesis at  $\alpha = 0.01$ )

(? = equivocal-  $\alpha = 0.01$ , but  $R^2 < 0.01$ )

(Yes = able to reject null hypothesis at 0.01 and  $R^2 \geq 0.01$ )

Aftercare attendance was entered into the multiple regression equation for the 6-month follow-up interval, only after two control variables, and accounted for only an additional 0.5% explanation of the variance in sobriety. In the 12-month follow-up data, aftercare improved

its relative position in terms of being entered into the equation, but still accounted for only 0.7% increase in the explanation of the variance in sobriety. Aftercare did not meet the minimum criteria to be selected for either the 18-month follow-up interval or the 24-month follow-up interval.

Age was the most important control variable selected in a stepwise multiple regression of sobriety. The contribution of age to the explanation of variance in sobriety was low. The additional explanatory power provided by age ranged from 0.7% to 1.3% of the variance in sobriety. The other control variables selected by SPSS for entry into the equation each accounted for less than one percent of the variance in sobriety and essentially were irrelevant.

Considering the control variables as a group, their combined influence only accounted for 1.8% to 3.2% of the variance in sobriety, depending on which follow-up interval was being examined (see Table 46). After taking the control variables into consideration, AA attendance remained the most important predictor of sobriety outcome. While the SPSS protocol found aftercare to be statistically eligible to be entered into the equation, even after taking AA attendance into consideration, the additional contribution of aftercare to the explanation of the variance in sobriety was negligible.<sup>19</sup>

A summary of the multiple regression findings suggested that AA attendance contributed to our understanding of sobriety, over and above the influence of a number of control variables. A cross-validation of the multiple regression equations on a second subset of data replicated these

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<sup>19</sup> Forcing the control variables into the multiple regression equation before the test variables resulted in slightly different control variables being selected. The specific control variables selected have very little relevance as their combined contribution to an explanation of the outcome variance was low. The total  $R^2$  change for the control variables was the same regardless of which method of entry of variables was chosen.

findings which gave credence to their validity in terms of having substantiated a relationship between the test variables and sobriety (see Table 47). The specific control variables were chosen because of their anticipated interaction with either the test variables or the outcome variables. In terms of their relationship with sobriety, the control variables added very little to our understanding of sobriety. That the majority of the variance in sobriety was unexplained, suggested that the contribution of other variables remained to be identified.

**Question 8: How effective was a model (Figure 1) which explained the variance in sobriety through a combination of test and control variables?**

Even taking into consideration the effect of the control variables, AA attendance continued to be significantly related to sobriety for each of the follow-up intervals. It was noted that AA attendance accounted for only a small portion of the variance in outcome. The majority of the variance in sobriety remained to be explained. The implication of this finding was further clarified through the use of discriminant analysis in which the sample was statistically divided into two groups on the basis of their sobriety outcome categories ("sober" and "not sober"). The discriminant function (made up of the contribution of the control variables and test variables) was used to predict sobriety for the sample. Their predicted outcomes were then compared with their actual outcomes.

Table 48 shows that the hypothetical model (see Figure 1) which generated this study did improve to a small degree the chances of correctly predicting subjects' sobriety outcomes. With no additional information, the probability of correct selection would have been maximized by random assignment of each subject on the basis of  $p = 0.50$  to either "sober" or "not sober" categories. The model improved the chances of correct selection from 12.8% to 15.5% over the anticipated results using a random selection device.

Table 48 demonstrates that, the model, as conceptualized, was not very effective. Although it improved the chances of correct prediction, many errors were still made. The model was somewhat more accurate in predicting clients who were not sober than sober clients. The average error in prediction ranged from 34.5% to 37.2%. The discriminant analysis of the data supported the multiple regression findings. AA attendance helped to predict sobriety. The combined influence of the control variables was not very large. The modest efficacy of the model in predicting sobriety suggested that the model could be enhanced through further exploration of other, as yet unknown, factors involved in sobriety.

### CRITICAL REVIEW OF THE STUDY

A secondary analysis of data must work within the constraints imposed by the primary data source. This issue was most cogent in discovering the "constructural bridge" between the author's interest in exploring AA attendance and aftercare in relation to outcome, and the available data from a large and heterogeneous sample. In particular, the issue became one of establishing the connections between the CATOR-III items as operational definitions and their respective constitutive meanings as theoretical constructs. The major limitation imposed by the primary data was that CATOR-III only asked questions about subjects' use of AA and aftercare in terms of attendance.

The author found it was important to take care *not* to attribute more significance to the findings than was warranted. For example, this study looked at the subject's report of AA attendance which, as a construct, had rather limited meaning in terms of an operational definition. AA attendance could not be construed in any fashion to imply that this study looked at the effectiveness of AA. In the same manner, a report of AA attendance does not measure the degree to which a subject attempted to resolve his/her chemical dependency problem. AA attendance, as used in this study, did not refer to an indirect measure of a subject's motivation.

AA attendance and aftercare attendance, however, as limited constructs, were important variables to be studied in their own right. Both the literature review and the interviews with the aftercare coordinators established the fact that clients involved in chemical dependency treatment

are expected to attend AA and aftercare as part of their posttreatment regimen. Consequently it was logical to ask the question of the CATOR-III subjects whether, in fact, they did attend these programs, and whether this attendance was related to measurable outcome results.

A second problem that developed during the planning stages of this dissertation involved the issue of which types of data analytic tools would be used in the secondary analysis. Initially a decision was made to take advantage of the interval quality of much of the data and use analysis of variance to explore the relationships among the respective variables. Given the relative ambiguity regarding the relationships among the variables, early on it became evident that contingency tables provided a more descriptive means of exploring the bivariate relationships among the variables.

The visual presentation of relationships provided by the contingency tables more than compensated for the problems created by their use in terms of talking about the magnitude of relationships between variables and observing the effect of one variable upon the other. As was demonstrated by the many graphs presenting bivariate comparisons, the measures of association for nominal data ( $\phi$  or Cramer's V) did not locate the relationship in terms of the effect of one variable upon the other. The graphic presentation, however, made it possible to augment the statistical finding with descriptive explanation.<sup>20</sup>

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<sup>20</sup> As previously noted, for variables which were both nominal and dichotomous,  $\phi^2 = r^2$ , which allowed for more specific discussion of the relationship between two variables. The issue still remained regarding the relative "comfort level" required in making assumptions about the function of a specific variable as an independent versus dependent variable.

In this regard the cross-lagged panel analysis was helpful, at least on an heuristic level, in the explication of bivariate relationships. It was important to observe that while one side of a cross-lagged panel analysis may have predominated, the opposing cross-lag still contributed to the relationship. Consequently the cross-lagged panel analysis added considerably to an understanding of the data by emphasizing the relative rather than absolute nature of relationships. The difficulty cross-lagged panel analysis brought to this study was that, as a data analytic tool, it was not able to take into account the complexity of the variables. Bivariate explication had to ignore the multidetermined nature of many of the variables.<sup>21</sup> As a result of the types of tools chosen for this study the degree to which relationships could be explored was limited.

In terms of first steps, however, the findings presented in this study have laid the groundwork for a more expansive exploration of the variables. Obvious disparities between the data and the model used to explore the CATOR-III data have suggested that in its simplicity, the model was not very effective. Utilizing the unanticipated findings in this data analysis, a model will be suggested in the next chapter, which, in combination with other data analytic tools (e.g., path analysis), would allow for further exploration of the provisional findings described in this study, focusing on the multidetermined aspects of many of the relationships among variables.

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<sup>21</sup> These limitations regarding bivariate analyses and cross-lagged panel analyses are relevant, not just for this study, but in general terms for any study which looks at social relationships.

## CHAPTER SEVEN: SUMMARY

### OVERVIEW

This chapter summarizes the study. The purpose, methods and findings are reviewed in the first section. A number of limitations regarding the generalizability of the findings are next presented. The third section addresses the implications of this study for the chemical dependency treatment field and implications for the social work profession. As part of the final section, an alternative model is presented which takes into account the multidetermined nature of many of the variables considered in this study. The summary chapter concludes with a brief commentary regarding the necessity of dealing with the ideological barriers which have had a limiting influence on the quality of research in the chemical dependency field

### SUMMARY OF STUDY

With rare exceptions, when clients complete inpatient chemical dependency treatment, they are encouraged to attend both aftercare and AA meetings. This study looked at 2,950 subjects who had been discharged from treatment between January, 1983 and July, 1985, and, who subsequently agreed to participate in a two year follow-up registry.



Subjects were interviewed every six months about a broad range of subjects. As a secondary analysis of a portion of this data, this study looked at the degree to which subjects attended aftercare and AA, and whether their attendance of these supportive services was correlated with a number of outcome measures which were suggestive of successful adaptation to their chemical dependency problems.

Based on a review of the literature, a model was developed which served to guide the data analysis. Subjects' performance on particular outcome variables were conceptualized as the result of the interactions among the eight control variables, reflecting important subject characteristics, and whether or not they attended aftercare and AA meetings. Based on this model, eight research questions and hypotheses to be tested were generated to explore the relationships between AA attendance, aftercare attendance and the control and outcome variables.

Following a short description of the demographic features of this sample, a series of bivariate comparisons were carried out to assess the impact of the control variables on the test variables and the one outcome variable (sobriety), for which a significant correlation with the test variables was established. Cross-lagged panel analysis was used to rule out the possibility of spurious relationships between the two test variables (AA attendance and aftercare attendance) and sobriety. The relationships among the synchronous correlations, autocorrelations, and cross-lagged correlations allowed for comments regarding directional influence between the two test variables and the one outcome variable.

Multiple regression analysis was used to determine the relative contribution of the test variables vis-a-vis the control variables in the

explanation of the variance in sobriety. Without identifying the independent variables as either test variables or control variables, the independent variables were first entered in a stepwise fashion into the multiple regression equation. In a second multiple regression analysis, the control variables were entered as a block and allowed to explain as much of the variance in sobriety as possible. Next the test variables were entered to see what was their contribution, over and above that already provided by the control variables.

For the purpose of cross-validation, the multiple regression analyses were developed on one subset randomly selected from the study sample. A second subset, independent from the first, was randomly selected to observe how the multiple regression equations held up when applied to a second set of data. In the final step of the multivariate analysis, discriminant analysis was used to comment on the effectiveness of the theoretical model guiding this study by using it to predict the sobriety outcomes of the subjects and comparing the predicted outcomes with the actual outcomes.

Overall the control variables played a relatively minor role in the results of this study. The control variables were found to be essentially unrelated to AA attendance, only weakly related to aftercare attendance, and somewhat more related to sobriety. When entered as a block into a multiple regression equation, considered together, the control variables only accounted for a small portion (from 1.8% to 3.2%) of the variance in sobriety. Age was the only control variable which explained at least one percent of the variance in sobriety.

Of the eleven outcome variables, only sobriety was found to be significantly correlated with both AA attendance and aftercare attendance over the two year time period. In addition to sobriety, three other outcome variables were related to aftercare. With the exception of sobriety, the measures of association between the other three outcome variables and aftercare were so small as to make interpretation of the significant relationships meaningless.

The strongest correlations in this study were between AA attendance and sobriety. Subjects who attended AA at least several times a month showed gradual and steady improvement in their sobriety rates over the two year period. Although statistically significant for the two year period, given the very small size of the measures of association it was difficult to demonstrate a meaningful relationship between aftercare attendance and sobriety beyond one year. Controlling for AA attendance, there were no significant relationships between aftercare and sobriety.

A cross-lagged panel analysis of the relationship between AA attendance and sobriety supported the hypothesis that the relationship between the two variables was real rather than the spurious result of the effects of a third variable. Comparing the cross-lagged correlations, it was evident that, while AA attendance was more important in determining sobriety than the reverse situation, the effects of sobriety on AA attendance were not ruled out.

The cross-lagged panel analysis of the relationship between aftercare and sobriety produced equivocal results. It was not possible to rule out the possibility that the apparent relationship between aftercare and sobriety was the spurious effect of a third variable which independently interacted

with both aftercare and sobriety to give the appearance of a relationship. The earlier bivariate comparisons suggested that AA attendance was probably the third variable which was related to both aftercare and sobriety. An examination of the cross-lagged correlations did not allow for comments regarding directional differences in the effects of one variable upon the other.

When entered in a stepwise fashion into a multiple regression equation, for each follow-up interval SPSS chose AA attendance first, from among the other independent variables, for its importance in explaining the variance in sobriety. Aftercare was selected for only the 6-month and 12-month follow-up intervals. In both cases the additional explanatory power provided by aftercare was very small. In the second multiple regression analysis, AA attendance continued to account for the largest portion of the explained variance in sobriety, even after all of the control variables had been taken into account. Taking into consideration the control variables and AA attendance, aftercare was statistically significant for each follow-up interval but only accounted for a negligible increase in the explanation of the variance in sobriety.

The adequacy of the model which was used to guide this study can be assessed on two levels. First, the multiple regression equations which were developed on one subset of the sample were cross-validated on a second subset of data. Comparing the absolute differences between the Multiple R of the first subset with the cross-validation  $r$  of the second subset, it was concluded that for each time period, the model did explain a portion of the variance in sobriety which held up when compared with a second set of data.

The effectiveness of the model, however, was called into question by the fact that the test variables and the control variables only accounted for between 9.0% and 11.6% of the variance in sobriety. The majority of the variance in sobriety was unaccounted for by this model. A discriminant function was calculated to predict sobriety outcomes which were then compared with the actual outcomes. Use of this model for predicting outcome scores resulted in a 12.8%- 15.5% improvement in prediction rates over what would have been obtained through randomly assigning subjects to either the "sober" or "not sober" categories.

The results of the data analysis showed that the relative effectiveness of the model which guided the data analysis was certainly questionable. The large percentage of variance in sobriety remaining to be explained, combined with an average predictive error rate, which ranged from 34.5% to 37.2%, suggested that the model upon which this study was based was not very effective and should be revised. The individual bivariate comparisons provided clues as to how this revision might be structured. Limitations experienced with the data analytic techniques used in this study suggested an alternative approach to the data analysis. Both the revised model and the alternative approach to the analysis of the data will be discussed later in this chapter.

### LIMITATIONS TO THE GENERALIZATION OF STUDY FINDINGS

The study sample was drawn from a population which, in many respects, was more representative of mainstream America than the majority of studies cited in the literature review. Thus, it is with some irony, that it must also be noted that the results have very limited generalizability beyond the CATOR-III population. The focus of this study, however, was on the relationships among variables rather than in the specific characteristics of the population under study. It was hoped that the increased information provided by excluding subjects for whom less than complete data were available, would be worth the reduction in ability of the findings to be generalized outside of the CATOR-III population.

It is important to recognize that this study was not an evaluation of the effectiveness of AA or aftercare. Rather, what was studied was the impact of the recommendation that subjects attend one or both of the supportive services. A correlation between AA attendance and sobriety does not address the issue of what processes were occurring to produce the observed effect. We do not know what it was about attending AA, for example, that was particularly relevant for the maintenance of sobriety in this sample. In a related manner, it should be stressed that in only looking at attendance, other relevant aspects of both test variables may have been missed which might have had more of an impact on their relationship with outcome.

A third limitation to this study relates to the state of the art of alcoholism treatment as it was being practiced when these subjects were

"socialized" into the roles of becoming recovering alcoholics. It goes without saying that good intentions precede effective service delivery. This appears to be particularly relevant for the alcoholism treatment field. For example, aftercare in the early 1970s differs from aftercare in the early 1980s, and will probably differ from what will be provided in the early 1990s. Contrasting aftercare as practiced in the 1970s with aftercare as practiced in the mid-1980s might be similar to comparing apples and oranges.

At the time these subjects went through treatment, the importance of aftercare was being touted, without a clear picture as to what types of aftercare services might be relevant. Consequently care must be taken when comparing aftercare at one point in time, where it was primarily a "statement of faith", with aftercare at a later point in time where specific and concrete services (e.g. relapse prevention, or couples' communication skills) are being offered. A low aftercare attendance rate may simply reflect the subjects' awareness of the redundant nature of the early relationship between aftercare and AA. Why go to aftercare to be told to go to AA?

One of the purposes of seeking out a large data pool on which to conduct this analysis was the expectation of obtaining a more realistic picture of the relationships between AA attendance, aftercare and outcome, as experienced by subjects who were not white, male, and middle-aged. In terms of age and gender, this goal was achieved to some degree. In terms of ethnic characteristics, however, this study provided some cause for concern. The overwhelming majority of subjects were white, with no substantive representation of other ethnic minorities. This unanticipated

outcome was viewed as a significant limitation in terms of not being able to explore attendance patterns for different ethnic groups.

The final limitation that will be addressed is to simply restate the point that the subjects in this study are clearly not representative of the experiences of alcoholics in general. As previously discussed, the majority of alcoholics never go through treatment. Only a small percent of alcoholics ever use AA. The results of this study are based on a very selective sample of alcoholics who had completed treatment, agreed to participate in fairly intensive follow-up for two years, and for whom all data were successfully gathered. Within this group, approximately 50% attended AA and a much smaller proportion attended aftercare. From this perspective, the issue of generalization of findings to other groups, not directly comparable to the specified characteristics of the study sample, would be moot.



### IMPLICATIONS OF THE STUDY FINDINGS

Future research will be required to determine if the relationships among variables identified in this study can be substantiated when applied to other populations. Much of "what we know" about alcoholism treatment has been developed on samples of indigent, middle-aged males treated in public facilities. This study serves a purpose of underscoring the relative nature of our knowledge regarding alcoholism treatment. The relatively high levels of sobriety and AA attendance reported by a broad spectrum sample of working class and middle class subjects stand in contrast to the generally negative pictures presented in other studies which explored the same variables in samples drawn from state hospitals and VA hospitals.

The absence of substantive representation of other ethnic groups, as noted above, was both unexpected and a limitation in terms of understanding "non-white" groups attendance of aftercare and AA. While it was recognized that a sizable percentage of the sample was drawn from the upper Midwest which has a larger proportion of whites than some other areas of the country, it was felt that other ethnic groups were significantly underrepresented in this sample. The absence of a significant minority presence in this sample, given what we know about the relative prevalence of chemical dependency problems among minority groups, suggests that the earlier identified concerns about minority access to treatment continue to be a relevant topic.

The incidental finding that the minority representation in this sample was only 5%, calls in to question the positive conclusion expressed by HHS

Secretary Bowen in the Sixth Special Report to the U.S. Congress on Alcohol and Health "that continuing attention is being paid to the heterogeneity apparent among alcoholics" (1987, p. 136).<sup>1</sup> Perhaps unfairly, it would seem that the minority representation continues to be more evident in the increased emphasis on the collection of morbidity and mortality statistics, than it does in the treatment outcome statistics.

The singular contribution of AA attendance towards the explanation of the variance in sobriety lends support to the efficacy of referring clients to AA upon their discharge from treatment. Subjects who attended AA had a demonstrable improvement in their sobriety rates when compared with those who did not attend AA. The cross-lagged panel analysis of the relationship between AA attendance and sobriety underscores the importance of this relationship. While the data suggested that, to a degree, sobriety may reinforce AA attendance, the reinforcing effect of AA attendance on sobriety was more important.

Of equal importance was the recognition that a sizable proportion of the study sample were able to maintain their sobriety without having to attend either AA or aftercare. AA attendance was useful to some, but not all of the subjects. The data support the idea that the referral to AA needs to be tempered with the observation that there are alternative routes to the achievement of sobriety. Certainly the data bring into question the heavy emphasis currently being placed by some treatment centers and staff on the absolute necessity of AA attendance for the maintenance of sobriety.

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<sup>1</sup> In fairness to Secretary Bowen, it should be noted that his comments were more directed to the diversity of diagnostic categories than to the issues regarding selective access to treatment of various ethnic and minority groups. The problem of access to treatment continues to be an important issue about which both clinicians and researchers should be cognizant.

The problems with the construct of aftercare experienced in this study served to limit the significance of the findings. However, the absence of a substantive relationship between aftercare and sobriety is an important finding which bears further consideration. As suggested earlier in this chapter, the issue may have more to do with the state of the art than whether or not aftercare is an essential element in the recovery process. In other health related fields, aftercare programs have been able to demonstrate their efficacy.

Presently, this data would support the recommendations of increasing the commitment of resources for research into aftercare, while tightening the focus of program emphasis around more specific and concrete service delivery options. Clearly the data from this study support the observation that aftercare programming must offer additional services beyond the traditional referral or reminder to attend AA in order to be utilized by a greater number of clients.

### IMPLICATIONS FOR THE SOCIAL WORK PROFESSION

It is with some irony that the author notes that in undertaking this study for the purpose of fulfilling the requirements of a Ph.D. program in social work that he found himself working, for the most part outside of the field. Surveying the literature in the chemical dependency field one can come away with the mistaken impression that the chemical dependency field is the sole purview of psychology and psychiatry. Of the hundreds of books and articles reviewed for this project only a handful were written by social workers, while a few more listed social workers as third or fourth authors.

On the other hand, when one looks at the staffing of chemical dependency treatment facilities, social workers can frequently be found in both clinical and administrative positions. One measure of the importance of the contribution of social work to the chemical dependency field can be found in the U.S. Air Force, which prefers that its alcoholism treatment center directors be Ph.D. social workers and its assistant directors be MSW social workers. Thus, while social work is visible in the provision of services, its absence is quite noticeable in the research component upon which many treatment decisions are ultimately based.

Earlier in this study, the author noted the absence of an organizing theoretical perspective which could serve to draw together the disparate and often contradictory findings identified in the treatment outcome literature. In this regard social work is perhaps, uniquely situated to offer guidance through its long standing appreciation of the person-situation

duality. Recent developments in the search for models, of which Germain and Gitterman's (1980) life model is perhaps most notable, have provided conceptual frameworks with which to approach the complexity of chemical dependency problems from a social work perspective.

The point being made is that the profession of social work has historically focused, at the level of service delivery, on the very problems which repeatedly confound the researcher who is attempting to make sense of the multidimensional aspects of chemical dependency problems. On the other hand, until recently the majority of social workers in the chemical dependency field have not had either the interest or the training to utilize the varied research tools which could help to sort out real treatment effects from appealing but often spurious effects.

This dissertation, in some respects, confirms the fluidity of our knowledge regarding chemical dependency issues. Assumptions regarding the inevitability of poor outcomes, based on observations of chronic inebriates, must be tempered by the more positive outcomes observed in this study which was based on a sample of higher functioning subjects. Perhaps the poor performance in the former group is more a function of access to resources than solely due to the effects of the problems themselves.

The lack of fit in terms of a model which ties together issues of sobriety with other measures of successful functioning speaks clearly to the need to look beyond the traditional research focus on individual or intrapersonal characteristics associated with chemical dependency problems. The earlier reported observation by Cronkite and Moos (1980) about the contribution of posttreatment experiences suggest that chemical

dependency problems must also be viewed as social problems in addition to looking at them in terms of their physical and psychological components.

This, however, will probably not occur unless social work, as a profession, takes more of an interest in contributing to knowledge building within the chemical dependency field. The continuation of status quo treatment practices in the presence of research data which questions their efficacy, without seeking further understanding, is in some respects unethical professional behavior. It is incumbent upon the profession to develop the requisite skills to become more active participants in the search for knowledge and to make use of the social work perspective in the development of research designs which further the explication of chemical dependency problems.

### QUESTIONS FOR FURTHER STUDY

This study has focused on the relationship between AA attendance, aftercare, and their relationships to measures of outcome functioning. The data analysis suggested that, for this sample, the two test variables were not related to the majority of outcome measures. AA attendance was found to be related to sobriety, although the majority of variance in sobriety remained to be explained. Aftercare may have been confounded with mental health treatment. The relationship between aftercare and sobriety was minimal, with most of the relationship being accounted for by the interaction between AA attendance and aftercare. The control variables chosen for inclusion in this study were weakly related to both the test variables and the outcome variables.

The general absence of significant relationships in this study is cause for concern. One conclusion to be drawn from these findings was that there was, in fact, very little relationship among the variables examined in this study. This conclusion, however, contradicts what has been previously demonstrated in other studies. A more appropriate conclusion might be to suggest that the model which generated the study was not very effective in terms of describing the relationships among variables. The limited findings of this study can be viewed as important clues to the construction of an alternative model which might provide a more effective means of explicating the relationships among the study variables.

The model (see Figure 1) which prompted the initial interest in this study was based, for the most part, on a review of the literature and

Figure 5: Model of Variable Relationships Suggested by a Secondary Analysis of the CATOR-III Data

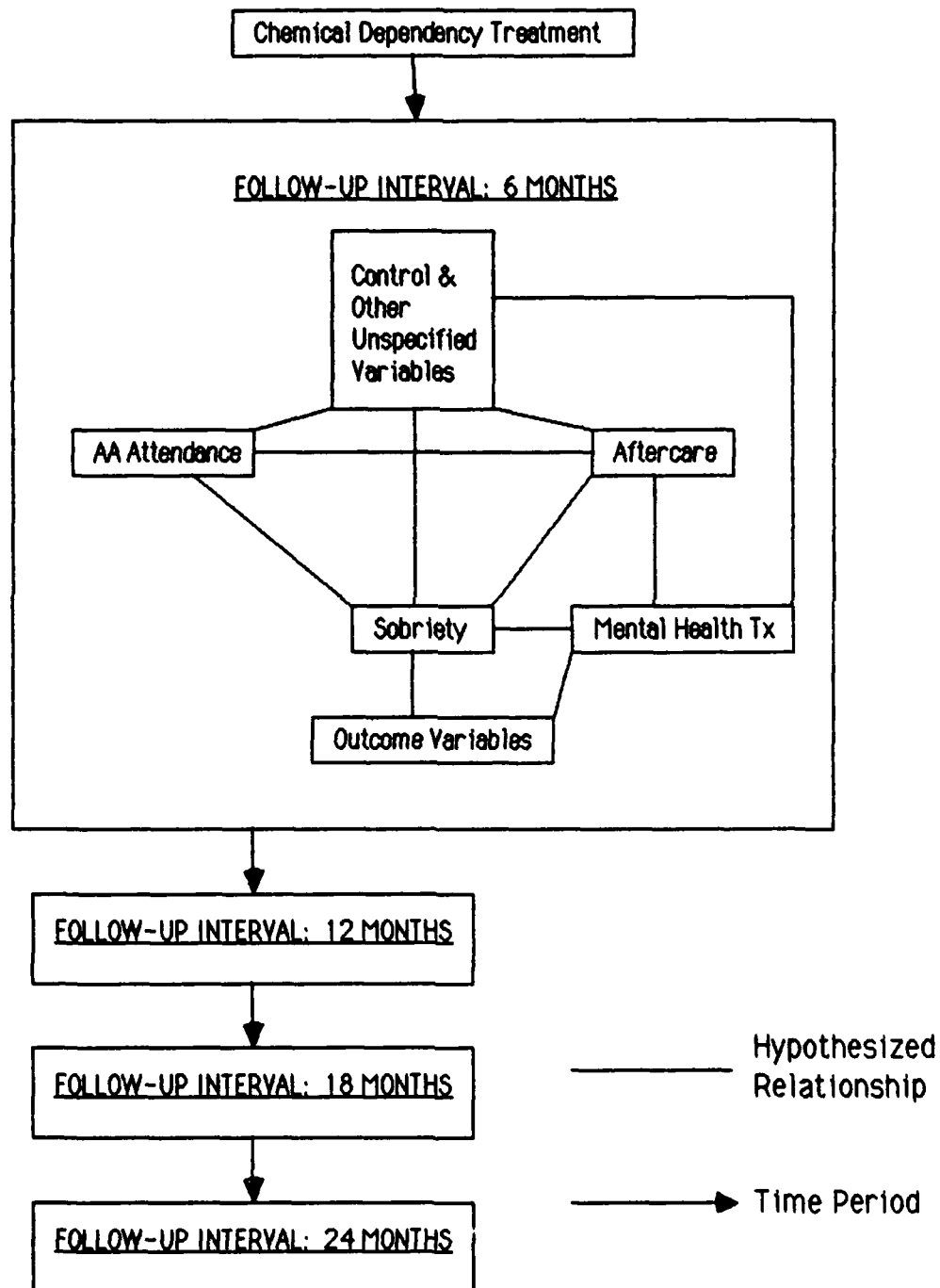
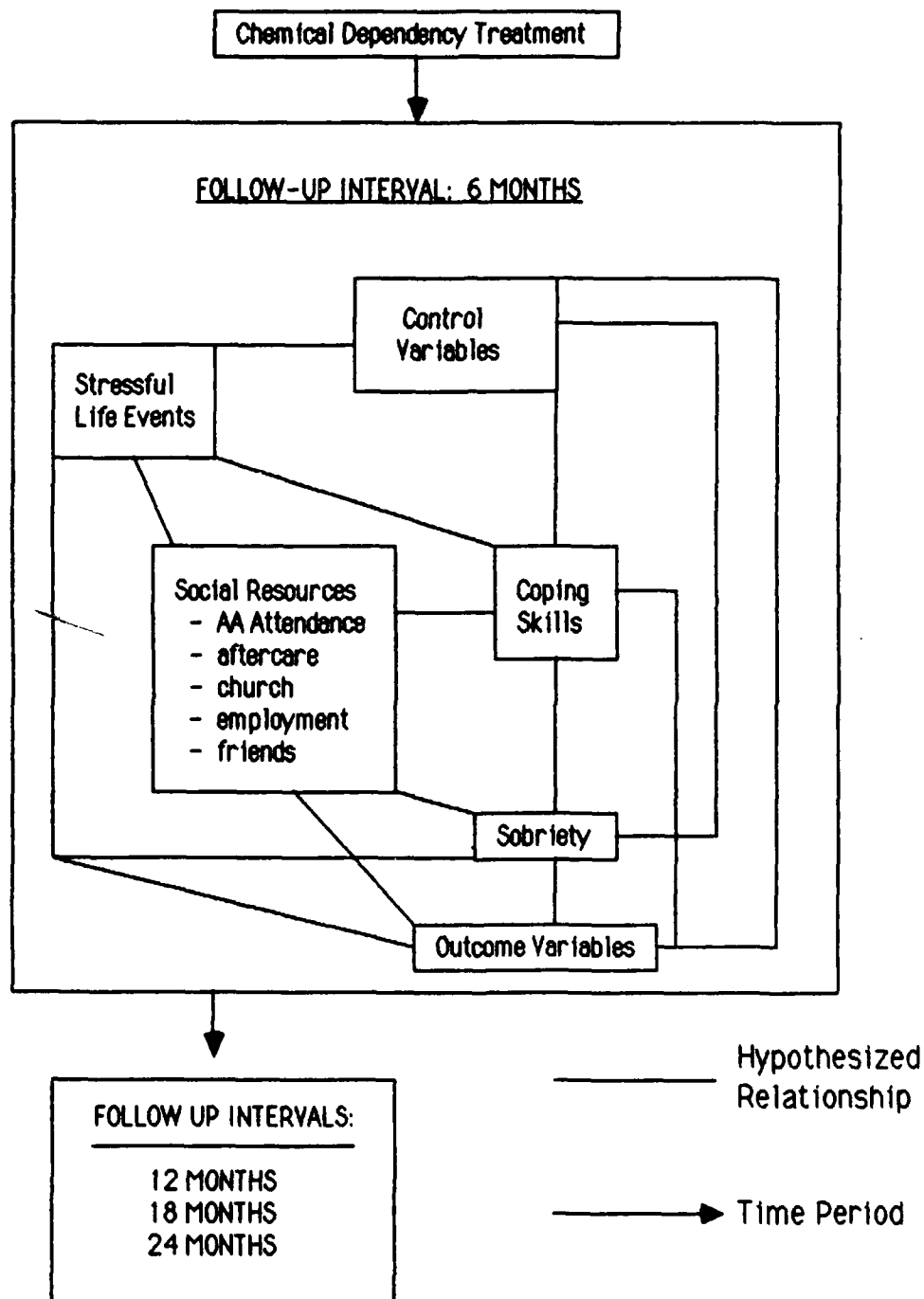




Figure 6: Model of Relationships Among Variables Suggested by This Study,  
Combined with a Framework Developed by Cronkite and Moos (1980).



clinical intuition. The model presented in Figure 5 attempts to combine the original model, grounded in theory, with the results of the secondary data analysis. The central feature of the new model, conceptualizes sobriety as an intermediate variable, which in turn, may influence outcome. In addition to AA and aftercare, mental health treatment was seen as a viable referral option for clients completing chemical dependency treatment. Figure 6 demonstrates that this model may be further expanded by combining it with Cronkite and Moos (1980) concepts of posttreatment functioning.

This new model would require more sophisticated data analysis tools than were used in this study. Multiple regression analysis was limited, in terms of its ability to separate direct effects from indirect effects. Path analysis, however, could effectively look at the relationship among the variables, "decompose the causal and non-causal components of simple correlations", and look at the direct and indirect effects of the variables on each other (Costello, 1980, p. 49).

A second area warranting further study was suggested by the interviews of the coordinators of the aftercare programs. Without exception, each aftercare coordinator felt their aftercare programs directly enhanced their clients' chances to remain sober. The anecdotal comments used to support their positions were varied and numerous. Summarized, the interviews suggested that such elements as relapse prevention, targeted groups, staffing levels, and alternative follow-up procedures may have an influence on outcome which may have been masked in this study by a research design which simply asked about attendance patterns. The index of *intensity* was an *ex post facto* attempt to enhance the efficacy of the construct of aftercare. The absence of findings might have simply been

related to the manner in which the construct was defined. The author notes that further explication of aftercare is warranted, with particular emphasis being placed on specific services being offered.

The sizable number of this sample who maintained their sobriety without attending AA or aftercare suggested that we have a less-than-perfect understanding of what skills, resources, and abilities are necessary to maintain sobriety. Likewise, the role of sobriety vis-a-vis the other outcome variables was ambiguous. In contrast to other studies which have recommended less emphasis be placed on sobriety, this study would suggest that exploring the dynamics involved in sobriety would be a particularly germane research topic. What are the factors which allow some clients to achieve sobriety with relative ease? When is sobriety a relevant variable in terms of outcome functioning?

Earlier, in the literature review, the author noted the degree to which the operational definition of sobriety determined, to a large degree, the outcome of the study. If sobriety was defined as continuous, never interrupted sobriety, the outcome results were predictably fairly dismal. Sobriety was defined in this study as either being present or absent (in the bivariate analyses, cross-lagged panel analyses, and discriminant analyses) or amount in terms of the number of months of sobriety reported per follow-up interval (in the multiple regressions of sobriety). The author concludes that an appropriately sensitive construct regarding sobriety has yet to be developed and consequently is an important topic for further study.

The absence of substantive ethnic representation raises a parenthetical concern regarding the accessibility of treatment. One assumption expressed earlier in this study was the hypothesis that, as

treatment moved beyond the social control issues regarding chronic inebriates, the population seeking treatment would increasingly be reflective of the demographic characteristics of the U.S. population. What factors are operating which serve to limit the accessibility to treatment? What happens when mainstream America samples are compared with samples drawn from the traditional public conduits for research subjects? How are chemical dependency problems being addressed in the ethnic groups which do not appear in the statistics of treatment outcome studies?

This brief potpourri of research questions generated by this study suggests that if one chooses to look, there are significant issues which, while dormant, are not resolved. The ideological conflict within the chemical dependency treatment field has had the effect of narrowing the focus of topics considered appropriate for research. The high quality, prospective research necessary to advance our understanding of the relationship between AA attendance, aftercare, and sobriety cannot take place in an environment in which the ideological boundaries are so rigidly established that the resources are not available to conduct the research.

This study documented the importance of AA attendance for a large percentage of the sample. Overall, an effect for aftercare could not be demonstrated. For many subjects, however, neither AA or aftercare were necessary to successfully maintain their sobriety. Other factors remain to be discovered which contribute to the explanation of the variance in sobriety. The relationship between sobriety and other outcome variables is ambiguous. Clearly the model of sobriety generated by current thinking is not adequate to address the multidetermined aspects of many of the variables considered in this study.

In some respects this study might be considered to be more of a "multi-cross-sectional" design than a longitudinal study. The combination of four follow-up intervals and use of cross-lagged panel analysis was an attempt to bridge the gap between strictly cross-sectional designs and longitudinal designs. Another approach, however, might be to consider cohort analysis and follow specific groups of subjects over time. For example, the cohort of first admissions compared with cohorts of multiple admissions might prove to more clearly explicate relationships among the variables under study.

The limitations of the ex post facto secondary data analysis design may have been reached. At some point in the near future the chemical dependency field is going to have to take a hard look at the rationale which discourages experimental designs. Much of the ambiguity regarding the relationships among variables in this field could be resolved by a prospective and longitudinal experimental research design. The problem, however, may be that the improved capacity to address chemical dependency issues may come at the expense of one or more ideological sacred cows.

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APPENDIX A: CATOR-III ITEMS

Note: The question number in parentheses refers to the number of the item as it was listed on the CATOR-III forms: For example, AA Attendance was identified as F-17, indicating that it was the 17th item on the Follow-up form.

F = follow-up (separate follow-up form for 6, 12, 18, and 24 months)

D = Discharge Checklist

I = CATOR-III Intake

H = CATOR-III History

1. Predictor Variables

A. AA Attendance (F-17): How often do you attend AA meetings?

- (1). I do not attend
- (2). once a month or less
- (3). several times a month
- (4). once a week or more

B. Aftercare Attendance (F-18): Have you attended any other groups? (Such as "aftercare", family group, support group, assertiveness training, etc.)

- (1). no
- (2). yes
- (3). completed

2. Control Variables

A. Age (calculated from the birth date and date of follow-up- listed in the Identification section of the CATOR-III Intake form).

B. Sex (listed in the identification section of the CATOR-III Intake Form).

- (1). male
- (2). female

## C. Marital Status (I-2):

- (1). single, never married
- (2). divorced
- (3). separated
- (4). widowed
- (5). living with mate
- (6). married

## D. Ethnicity (I-1):

- (1). White
- (2). Hispanic
- (3). Black
- (4). Native American
- (5). Asian/other

## E. Years of Education (highest number of years reported in I-3).

## F. Employability (Based on current employment status as reported in I-5).

- (1). Employable:
  - (a). full-time employment
  - (b). part-time employment
  - (c). unemployed
- (2). Not employable:
  - (a). retired/disabled
  - (b). homemaker
  - (c). student

## G. Previous chemical dependency treatment (exact number of previous admissions recorded in H-29).

## H. Type of Substance (based on chemical usage reported in questions H-33 through H-42).

- (1). alcohol only
- (2). drugs and alcohol
- (3). drugs other than alcohol only

### 3. Outcome Variables

- A. Sobriety (exact number of months were reported in F-14).
- B. Full-time employment During the past six months how many months have you worked full-time? (exact number of months were reported in F-25).
- C. Part-time Employment: During the past six months how many months have you worked part-time? (exact number of months were reported in F-26).
- D. Welfare Assistance: For how many many of the last six months did you receive welfare? (exact number of months were reported in F-20).
- E. Disability Income: For how many of the past six months did you get disability? (exact number of months were reported in F-22).
- F. Injuries: During the past six months how many office visits have you made to a doctor for injuries? (exact number of visits were reported in F-38).
- G. Visits to ER: During the past six months how many times have you received services in an emergency room? (exact number of times were reported in F-37).
- H. Hospitalized for Medical Problems: During the past six months how many days were you in a hospital for a medical problem? (exact number of days were reported in F-36).
- I. Hospitalized for Emotional Problems: During the past six months how many days were you in a hospital for an emotional problem? (exact number of days were reported in F-42).
- J. Misdemeanors: Arrests in the past six months for charges related to chemical use. (exact number of misdemeanor arrests were reported in F-58).
- K. Felonies: Arrests in the past six months for charges related to chemical use. (number of felony arrests were reported in F-59).

APPENDIX B: PROTOCOL FOR INTERVIEWS WITH  
AFTERCARE COORDINATORS

Treatment Center \_\_\_\_\_ Phone \_\_\_\_\_

Contact Person \_\_\_\_\_ Date \_\_\_\_\_

1. Where program housed \_\_\_\_\_

1. Length of aftercare program \_\_\_\_\_

2. staffing \_\_\_\_\_

A. Professional \_\_\_\_\_

B. Paraprofessional \_\_\_\_\_

C. Volunteer \_\_\_\_\_

3. Types of counseling offered

A. Individual \_\_\_\_\_

B. Group \_\_\_\_\_

C. Family \_\_\_\_\_

D. Referral \_\_\_\_\_

E. Other \_\_\_\_\_

4. Aftercare planning session prior to discharge \_\_\_\_\_

6. Follow-up contact \_\_\_\_\_

7. Estimate percent of population available for aftercare \_\_\_\_\_

8. Strong point of program \_\_\_\_\_

9. Different from other programs \_\_\_\_\_

10. Other \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

APPENDIX C: INTENSITY OF AFTERCARE CHECKLIST

<u>Areas Evaluated</u>		<u>Treatment Centers</u>							
	<u>Points</u>	<u>10<sup>1</sup></u>	<u>70</u>	<u>110</u>	<u>130</u>	<u>310</u>	<u>330</u>	<u>420</u>	<u>430</u>
1. Length of Aftercare:									
1- 5 months	1	1	1	1	1	1	1	1	1
6- 11 months	1	1		1	1	1	1		
1 year	1	1		1	1	1	1		
2 years	1	1		1	1	1			
2. Services offered:									
group	1	1	1	1	1	1	1	1	1
individual	1			1				1	
family	1	1			1	1	1	1	1
special groups	1	1						1	1
3. Staffing									
professional	3	3	3	3		3	3	3	3
paraprofessional	2			2				2	
volunteer	1			1	1	1		1	
4. Record Keeping									
attendance	1	1	1	1	1		1	1	1
progress	1	1		1				1	
summary	1	1		1	1	1	1	1	1
5. Referral Process									
written care plan	1			1		1		1	1
formal referral	1	1	1	1	1	1		1	1
formal follow-up	1		1	1				1	
6. Return visit program	1			1	1				
7. Alumni Association	1	1		1	1	1	1	1	1
Σ POSSIBLE POINTS	22	15	8	20	12	14	11	18	12

<sup>1</sup> The numbers refer to treatment center codes. Per agreement with CATOR, no identifying information was to be used in this study. Further inquiries should be addressed to:

Dr. Norman G. Hoffmann, Executive Director  
 CATOR- Suite 420  
 17 West Exchange Street  
 St. Paul, MN 55102



Areas EvaluatedTreatment Centers

	<u>Points</u>	<u>630</u>	<u>640</u>	<u>810</u>	<u>820</u>	<u>830</u>	<u>850</u>	<u>910</u>
1. Length of Aftercare:								
1- 5 months	1	1	1	1	1	1	1	1
6- 11 months	1	1		1	1	1	1	
1 year	1			1	1	1	1	
2 years	1				1			
2. Services offered:								
group	1	1	1	1	1	1	1	1
individual	1	1						1
family	1	1		1		1	1	1
special groups	1	1					1	
3. Staffing								
professional	3	3	3	3		3	3	3
paraprofessional	2			2				
volunteer	1				1	1	1	
4. Record Keeping								
attendance	1	1	1	1		1	1	1
progress	1		1	1		1	1	1
summary	1	1		1		1	1	1
5. Referral Process								
written care plan	1		1			1		
formal referral	1	1	1	1	1	1	1	
formal follow-up	1	1	1	1	1		1	
6. Return visit program	1			1	1		1	
7. Alumni Association	1	1		1	1	1	1	1
$\Sigma$ POSSIBLE POINTS	22	14	11	17	10	15	17	10

APPENDIX D: SELECTED TREATMENT PROGRAMS, DIVIDED BY  
THEIR INTENSITY OF AFTERCARE INDEX SCORE

<u>Low Intensity</u> <u>(Index 8- 12)</u>	<u>Moderate Intensity</u> <u>(Index 13- 15)</u>	<u>High Intensity</u> <u>(Index 17- 20)</u>
70 <sup>1</sup>	10	110
130	310	420
330	649	810
430	830	850
640		
820		
910		

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<sup>1</sup> The numbers refer to treatment center codes. Per agreement with CATOR, no identifying information was to be used in this study. Further inquiries should be addressed to:

Dr. Norman G. Hoffmann, Executive Director  
CATOR- Suite 420  
17 West Exchange Street  
St. Paul, MN 55102

APPENDIX E1: AA ATTENDANCE BY CONTROL VARIABLES6 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	106.07	(64)	0.190
2. GENDER	6.98	(2)	0.049
3. MARITAL STATUS	13.35	(15)	0.039
4. ETHNICITY	11.04	(12)	0.035
5. EMPLOYABILITY	11.80	(2)	0.064
6. PRIOR CD TX	68.75	(39)	0.090
7. TYPE OF SUBSTANCE	1.11	(2)	0.020
8. EDUCATION	35.13	(24)	0.112

12 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	106.99	(64)	0.190
2. GENDER	4.84	(2)	0.040
3. MARITAL STATUS	19.49	(15)	0.047
4. ETHNICITY	12.98	(12)	0.038
5. EMPLOYABILITY	8.83	(2)	0.055
6. PRIOR CD TX	63.06	(39)	0.085
7. TYPE OF SUBSTANCE	4.59	(2)	0.040
8. EDUCATION	60.15	(24)	0.147

18 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	75.56	(64)	0.160
2. GENDER	5.24	(2)	0.042
3. MARITAL STATUS	15.41	(15)	0.042
4. ETHNICITY	32.48	(12)	0.061
5. EMPLOYABILITY	7.34	(2)	0.050
6. PRIOR CD TX	62.70	(39)	0.085
7. TYPE OF SUBSTANCE	4.23	(2)	0.038
8. EDUCATION	49.08	(24)	0.133

24 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	99.19	(64)	0.184
2. GENDER	5.85	(2)	0.045
3. MARITAL STATUS	16.14	(15)	0.043
4. ETHNICITY	8.19	(12)	0.030
5. EMPLOYABILITY	7.23	(2)	0.049
6. PRIOR CD TX	59.78	(39)	0.083
7. TYPE OF SUBSTANCE	5.48	(2)	0.038
8. EDUCATION	52.35	(24)	0.137

APPENDIX E2: AFTERCARE ATTENDANCE BY CONTROL VARIABLES6 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	115.74	(64)	0.198
2. GENDER	11.24	(2)	0.062
3. MARITAL STATUS	24.65	(10)	0.065
4. ETHNICITY	6.90	(8)	0.034
5. EMPLOYABILITY	17.03	(2)	0.077
6. PRIOR CD TX	11.85	(39)	0.046
7. TYPE OF SUBSTANCE	20.69	(2)	0.085
8. EDUCATION	32.04	(24)	0.107

12 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	59.90	(64)	0.142
2. GENDER	35.36	(2)	0.110
3. MARITAL STATUS	7.73	(15)	0.036
4. ETHNICITY	4.92	(8)	0.029
5. EMPLOYABILITY	6.17	(2)	0.046
6. PRIOR CD TX	32.06	(39)	0.064
7. TYPE OF SUBSTANCE	22.07	(2)	0.088
8. EDUCATION	49.12	(24)	0.123

18 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	72.02	(64)	0.156
2. GENDER	30.87	(2)	0.102
3. MARITAL STATUS	16.74	(15)	0.054
4. ETHNICITY	13.32	(8)	0.048
5. EMPLOYABILITY	3.06	(2)	0.032
6. PRIOR CD TX	23.56	(39)	0.064
7. TYPE OF SUBSTANCE	23.19	(2)	0.090
8. EDUCATION	45.57	(24)	0.132

24 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	81.43	(64)	0.166
2. GENDER	32.76	(2)	0.106
3. MARITAL STATUS	9.54	(15)	0.040
4. ETHNICITY	3.10	(8)	0.023
5. EMPLOYABILITY	1.80	(2)	0.025
6. PRIOR CD TX	20.74	(39)	0.060
7. TYPE OF SUBSTANCE	27.87	(2)	0.099
8. EDUCATION	48.44	(24)	0.132

APPENDIX E3: AA ATTENDANCE BY OUTCOME VARIABLES6 MONTHS

<u>OUTCOME VARIABLES</u>	<u>SIGNIFICANCE OF F-TEST</u>	<u>MULTIPLE R</u>
1. FULL-TIME EMPLOYMENT	0.342	0.034
2. PART-TIME EMPLOYMENT	0.690	0.023
3. WELFARE ASSISTANCE	0.362	0.033
4. DISABILITY ASSISTANCE	0.941	0.012
5. HOSPITALIZED MED. PROB.	0.019	0.059
6. VISITS TO ER	0.978	0.008
7. INJURIES	0.031	0.056
8. HOSPITALIZED EMOT. PROB.	0.690	0.023
9. MISDEMEANORS	0.063	0.050
10. FELONIES	0.013	0.061
11. SOBRIETY	0.001	0.264

12 MONTHS

<u>OUTCOME VARIABLES</u>	<u>SIGNIFICANCE OF F-TEST</u>	<u>MULTIPLE R</u>
1. FULL-TIME EMPLOYMENT	0.002	0.071
2. PART-TIME EMPLOYMENT	0.937	0.012
3. WELFARE ASSISTANCE	0.170	0.042
4. DISABILITY ASSISTANCE	0.092	0.047
5. HOSPITALIZED MED. PROB.	0.269	0.037
6. VISITS TO ER	0.406	0.032
7. INJURIES	0.001	0.083
8. HOSPITALIZED EMOT. PROB.	0.732	0.021
9. MISDEMEANORS	0.147	0.043
10. FELONIES	0.097	0.047
11. SOBRIETY	0.001	0.317

18 MONTHS

1. FULL-TIME EMPLOYMENT	0.483	0.029
2. PART-TIME EMPLOYMENT	0.258	0.037
3. WELFARE ASSISTANCE	0.746	0.021
4. DISABILITY ASSISTANCE	0.267	0.037
5. HOSPITALIZED MED. PROB.	0.775	0.020
6. VISITS TO ER	0.851	0.017
7. INJURIES	0.232	0.038
8. HOSPITALIZED EMOT. PROB.	0.197	0.040
9. MISDEMEANORS	0.852	0.016
10. FELONIES	0.820	0.018
11. SOBRIETY	0.001	0.317

24 MONTHS

<u>OUTCOME VARIABLES</u>	<u>SIGNIFICANCE OF F-TEST</u>	<u>MULTIPLE R</u>
1. FULL-TIME EMPLOYMENT	0.017	0.059
2. PART-TIME EMPLOYMENT	0.429	0.031
3. WELFARE ASSISTANCE	0.890	0.015
4. DISABILITY ASSISTANCE	0.768	0.020
5. HOSPITALIZED MED. PROB.	0.310	0.035
6. VISITS TO ER	0.507	0.028
7. INJURIES	0.408	0.032
8. HOSPITALIZED EMOT. PROB.	0.242	0.038
9. MISDEMEANORS	0.356	0.034
10. FELONIES	0.015	0.060
11. SOBRIETY	0.001	0.308



APPENDIX E4: AFTERCARE ATTENDANCE BY OUTCOME VARIABLES6 MONTHS

<u>OUTCOME VARIABLES</u>	<u>SIGNIFICANCE OF F-TEST</u>	<u>MULTIPLE R</u>
1. FULL-TIME EMPLOYMENT	0.274	0.030
2. PART-TIME EMPLOYMENT	0.001	0.069
3. WELFARE ASSISTANCE	0.157	0.036
4. DISABILITY ASSISTANCE	0.419	0.025
5. HOSPITALIZED MED. PROB.	0.565	0.020
6. VISITS TO ER	0.148	0.037
7. INJURIES	0.208	0.033
8. HOSPITALIZED EMOT. PROB.	0.087	0.041
9. MISDEMEANORS	0.311	0.029
10. FELONIES	0.221	0.032
11. SOBRIETY	0.001	0.132

12 MONTHS

<u>OUTCOME VARIABLES</u>	<u>SIGNIFICANCE OF F-TEST</u>	<u>MULTIPLE R</u>
1. FULL-TIME EMPLOYMENT	0.418	0.025
2. PART-TIME EMPLOYMENT	0.064	0.044
3. WELFARE ASSISTANCE	0.208	0.033
4. DISABILITY ASSISTANCE	0.671	0.017
5. HOSPITALIZED MED. PROB.	0.165	0.035
6. VISITS TO ER	0.354	0.027
7. INJURIES	0.463	0.023
8. HOSPITALIZED EMOT. PROB.	0.179	0.035
9. MISDEMEANORS	0.919	0.008
10. FELONIES	0.326	0.028
11. SOBRIETY	0.001	0.145

18 MONTHS

1. FULL-TIME EMPLOYMENT	0.022	0.052
2. PART-TIME EMPLOYMENT	0.001	0.071
3. WELFARE ASSISTANCE	0.003	0.064
4. DISABILITY ASSISTANCE	0.357	0.027
5. HOSPITALIZED MED. PROB.	0.200	0.033
6. VISITS TO ER	0.494	0.022
7. INJURIES	0.738	0.015
8. HOSPITALIZED EMOT. PROB.	0.052	0.045
9. MISDEMEANORS	0.874	0.010
10. FELONIES	0.827	0.011
11. SOBRIETY	0.001	0.087

24 MONTHS

<u>OUTCOME VARIABLES</u>	<u>SIGNIFICANCE OF F-TEST</u>	<u>MULTIPLE R</u>
1. FULL-TIME EMPLOYMENT	0.023	0.051
2. PART-TIME EMPLOYMENT	0.275	0.030
3. WELFARE ASSISTANCE	0.948	0.006
4. DISABILITY ASSISTANCE	0.098	0.040
5. HOSPITALIZED MED. PROB.	0.960	0.005
6. VISITS TO ER	0.020	0.052
7. INJURIES	0.626	0.018
8. HOSPITALIZED EMOT. PROB.	0.001	0.092
9. MISDEMEANORS	0.044	0.047
10. FELONIES	0.892	0.009
11. SOBRIETY	0.001	0.099

APPENDIX E5: SOBRIETY BY CONTROL VARIABLES6 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	141.67	(64)	0.219
2. GENDER	107	(1)	0.049 <sup>1</sup>
3. MARITAL STATUS	46.31	(5)	0.039
4. ETHNICITY	3.96	(4)	0.037
5. EMPLOYABILITY	0.008	(1)	0.002
6. PRIOR CD TX	55.39	(13)	0.139
7. TYPE OF SUBSTANCE	37.04	(2)	0.114
8. EDUCATION	38.66	(24)	0.118

12 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	117.98	(64)	0.200
2. GENDER	5.38	(1)	0.044
3. MARITAL STATUS	16.07	(5)	0.074
4. ETHNICITY	7.58	(4)	0.051
5. EMPLOYABILITY	2.98	(1)	0.033
6. PRIOR CD TX	37.70	(13)	0.115
7. TYPE OF SUBSTANCE	16.54	(2)	0.108
8. EDUCATION	45.56	(24)	0.128

<sup>1</sup> With 1 df, the measure of association is  $\phi$  rather than Cramer's V.

18 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	135.41	(64)	0.214
2. GENDER	9.00	(1)	0.056 <sup>2</sup>
3. MARITAL STATUS	34.48	(5)	0.108
4. ETHNICITY	8.25	(4)	0.053
5. EMPLOYABILITY	0.007	(1)	0.002
6. PRIOR CD TX	36.25	(13)	0.112
7. TYPE OF SUBSTANCE	33.37	(2)	0.088
8. EDUCATION	37.91	(24)	0.117

24 MONTHS

<u>CONTROL VARIABLES</u>	<u>CHI SQUARE</u>	<u>(DF)</u>	<u>CRAMER'S V</u>
1. AGE	120.67	(64)	0.219
2. GENDER	3.06	(1)	0.033
3. MARITAL STATUS	28.27	(5)	0.098
4. ETHNICITY	6.10	(4)	0.046
5. EMPLOYABILITY	0.186	(1)	0.009
6. PRIOR CD TX	16.93	(13)	0.077
7. TYPE OF SUBSTANCE	22.24	(2)	0.088
8. EDUCATION	39.85	(24)	0.120

<sup>2</sup> With 1 df, the measure of association is  $\phi$  rather than Cramer's V.

APPENDIX F: DISCRIMINANT ANALYSES- SOBRIETY BY  
TEST AND CONTROL VARIABLES

<u>Time Period</u>	<u>Eigenvalue</u>	<u>Canonical Correlation</u>	<u>Wilks Lambda</u>	<u>Sig</u>
06 months	0.073	0.262	0.931	0.0000
12 months	0.106	0.309	0.904	0.0000
18 months	0.098	0.299	0.911	0.0000
24 months	0.099	0.300	0.910	0.0000

Variables Included in the Discriminant Function<sup>1</sup>

<u>6 months</u>	<u>12 months</u>	<u>18 months</u>	<u>24 months</u>
Prior Tx	Ethnicity	Age	Age
Ethnicity	Employability	Sex	Education
AA	Age	Prior Tx	Sex
Aftercare	Prior Tx	Ethnicity	Employability
	Sex	Employability	Prior Tx
	Education	Education	Ethnicity
	AA	AA	AA
	Aftercare		

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<sup>1</sup>Control variables were entered as a group, followed by AA and then aftercare.